



THE SCHOOL OF PUBLIC POLICY PUBLICATIONS

SPP Research Paper

Volume 12:10

March 2019

PROVINCIAL PUBLIC INFRASTRUCTURE SPENDING AND FINANCING IN ALBERTA: SEARCHING FOR A BETTER COURSE

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SUMMARY

The Alberta government has been spending a lot of money lately on infrastructure, possibly partly because it was under the impression that Alberta suffered an infrastructure deficit relative to other provinces. That impression was provided in a 2015 capital-planning report by former Bank of Canada governor David Dodge, commissioned by the NDP government. Dodge also suggested that the province had ample room to borrow aggressively to catch up to the five other provinces to which he had compared Alberta (namely: B.C., Saskatchewan, Manitoba, Ontario and Quebec). Unfortunately, it appears that impression was inaccurate.

Vast amounts of public money may have been spent, and unnecessary debt incurred, all based on a faulty justification. However, measured using alternative ratios, Alberta actually has a substantial infrastructure surplus relative to the other provinces. Thankfully, the Alberta government only partially followed Dodge's aggressive program for borrowing and building. Had it followed it entirely, Alberta's debt — again, using seemingly more appropriate measures than those used by Dodge — would have risen far higher than it is (or is projected to become) today, by some measures exceeding all other comparison provinces except Ontario.

By comparing Alberta against those other provinces, Dodge missed an important point: That Alberta is different. Dodge measured the value of provincial capital stock against GDP, but Alberta's economy features far higher productivity levels than those other provinces. Using GDP as the benchmark for necessary infrastructure suggests that a more productive worker requires more roads, highways, bridges, water-treatment, and so forth, than a less productive worker, which is questionable. A seemingly more appropriate way to assess the need for infrastructure would be based on population and population growth, so on a per capita basis. Measured on a per capita basis, Alberta has a 15-per-cent greater stock than any of the other provinces, including a startling 44-per-cent surplus over Ontario. Had Alberta followed Dodge's advice entirely, and achieved a ratio

of capital stock to GDP equivalent to the average of the other provinces, its surplus over the other provinces would have grown to a stunning 46-per-cent greater than the five-province average in contrast to the current 24-per-cent.

The Alberta government's infrastructure spending has been erratic. It has followed a pattern of wild swings over the past several decades, with splurges on capital investments during one part of an economic cycle, and then starving capital needs during another part. This is the fundamental problem that the Alberta government needs to address if it wants to avoid misguided infrastructure plans, whether for increases or for decreases. Alberta must develop a more stable planning and funding structure for its capital plan that accounts for ongoing maintenance and expansions for population and economic growth only, and stick to it. It is entirely possible to make capital spending sufficient and more stable in Alberta, if governments would only exhibit the political will to do so.

1. INTRODUCTION

Adequate public infrastructure is essential to serve citizens and to support a productive economy. Public capital and investment get special attention in Alberta with its rapidly, though erratically, growing population and economy. Even during economic downturns, infrastructure receives particular attention as the province wrestles with still-growing needs and concerns for economic stabilization but with diminished funds. Understanding better the important roles of provincial capital and investment within the uniqueness of the Alberta economic environment motivates this study.

The analysis of the paper begins with a brief overview of capital assets in Alberta. Those are dominated by highways and buildings, which are dedicated to transportation, health care and education. The next section is a review of aggregate provincial government investment and capital-stock levels from 1961 to 2016. The most notable findings are the vast swings in investment and even large swings in per person levels of capital stocks. Section 4 presents an examination of the anomaly that Alberta, relative to other provinces, has a low level of provincial net capital stock relative to GDP but a high level of capital stock and investment per person. The explanation, as demonstrated here and not generally recognized, is that the Alberta economy is different in important ways from that of most other provinces. The analysis suggests that interprovincial comparisons to GDP can often be misleading. Also, household income, not GDP, appears to be the major determinant of public infrastructure.

Section 5 looks at capital financing. Since 2008, there has been a growing reliance on debt finance. Also, what appear to be (interprovincially) moderate levels of debt relative to GDP are large relative to provincial government revenue (which is argued to be a more meaningful comparator). The role of provincial government investment as a stabilization tool is the subject of Section 6. Over the long term, the use for stabilization has been mixed. The overall surplus/deficit pattern, however, has been much more counter-cyclic. Since 2000, and especially in the 2009 and 2015 downturns, more emphasis has been put on stabilization but at the cost of greatly reduced financial reserves and growing debt (with debt increasing even as the economy gradually improves). The reason for these developments is that both resource-revenue setbacks (the lasting drop in natural gas prices and the drop in oil prices that are expected to diminish the provincial government's resource revenues for some time) have been treated as if caused by cyclic rather than structural changes. Possible avenues for improving budgeting and particularly capital budgeting are addressed in Section 7. The final part of the paper is a summary and conclusion.

2. PROVINCIAL CAPITAL ASSETS IN ALBERTA

It is helpful to begin with an understanding of what constitutes provincial government capital assets (also referred to broadly as provincial government infrastructure). Table 1 provides two descriptions of the Alberta government's capital assets. The upper panel lists the types of capital assets of the province and the distribution of net book value as reported in the government's latest annual report. In that analysis, a distinction is made between infrastructure and general capital assets. Infrastructure represents 39 per cent of the total capital assets and infrastructure is almost entirely transportation related (notably roads, highways and bridges). Only small shares are found in dams and water-management structures or land improvements. General capital assets represent 61 per cent of the total capital assets and buildings make up four-fifths of that class. In fact, at 49 per cent, buildings represent half of the provincial government's total capital assets. Other types of general capital — that is, equipment, computers, land and other — make relatively small contributions. Overall, buildings and highways (and bridges) amount to about 85 per cent of the Alberta government's capital assets.

The lower panel in Table 1 provides insight into the government programs to which the capital assets are devoted. Lacking an inventory of assets by program, the data reported are the planned capital expenditures (both for new capital and for maintenance and renewal) for the next five years as outlined in Budget 2018. Roads and bridges take the largest share at 27 per cent, but are closely followed by health care at 25 per cent. Education in aggregate is expected to receive 20 per cent of capital expenditures (about two-thirds for schooling and one-third for adult education). Ten per cent of outlays are to be directed towards climate change and environmental protection, and eight per cent to government facilities and equipment. The other five program areas noted represent less than 10 per cent of the total.

Overall, the provincial government's capital assets are primarily in highways and in buildings. In turn, the majority of the province's capital is devoted to supporting transportation, health care and education.

TABLE 1 DISTRIBUTION OF ALBERTA PROVINCIAL GOVERNMENT'S CAPITAL ASSETS BY TYPE AND PROGRAM

Alberta Government Tangible Assets by Type, 2018 ^a	
	Percentage
General Capital Assets	61.33
Buildings	49.11
Equipment	4.18
Computer (hardware & software)	2.13
Land	5.24
Other	0.67
Infrastructure	38.66
Highways, roads & airstrips	32.86
Bridges	3.15
Dams & water management structures	2.11
Land improvements	0.54
Total	100.00

Alberta Core Government Capital Spending Plan by Program, 2018/19 to 2022/23 ^b	
	Percentage
Adult education & skills	6.55
Agriculture, natural resources & industry	2.14
Climate change, environment	10.02
Family, social support & housing	3.67
Gov't facilities, equipment & other	7.82
Health	25.33
Public safety & emergency	1.93
Roads and bridges	26.68
Schools	13.66
Sport, arts, recreation & culture	1.00
Other	1.20
Total	100.00

Notes: a) From Annual Report of Government of Alberta, 2017-18, p 76. b) The five-year capital spending plan of the Alberta government from Budget 2018. Data are for core provincial government, which here excludes the self-financed capital expenditures of the SUCH sector (i.e., school, universities, colleges and health authorities) and excludes grants to the municipal governments, but does include planned capital maintenance and renewal outlays by program.

3. PUBLIC INFRASTRUCTURE EXPENDITURES IN ALBERTA

Public infrastructure provides vital services to citizens and to the economy. As such, one might expect that, over time, the public capital stock would tend to grow in parallel with the population and the economy and that infrastructure investment would expand in a corresponding fashion. Yet, in Alberta, despite the considerable population and economic growth, the evidence suggests otherwise. That is, the levels of and the development of infrastructure have been quite uneven over time.

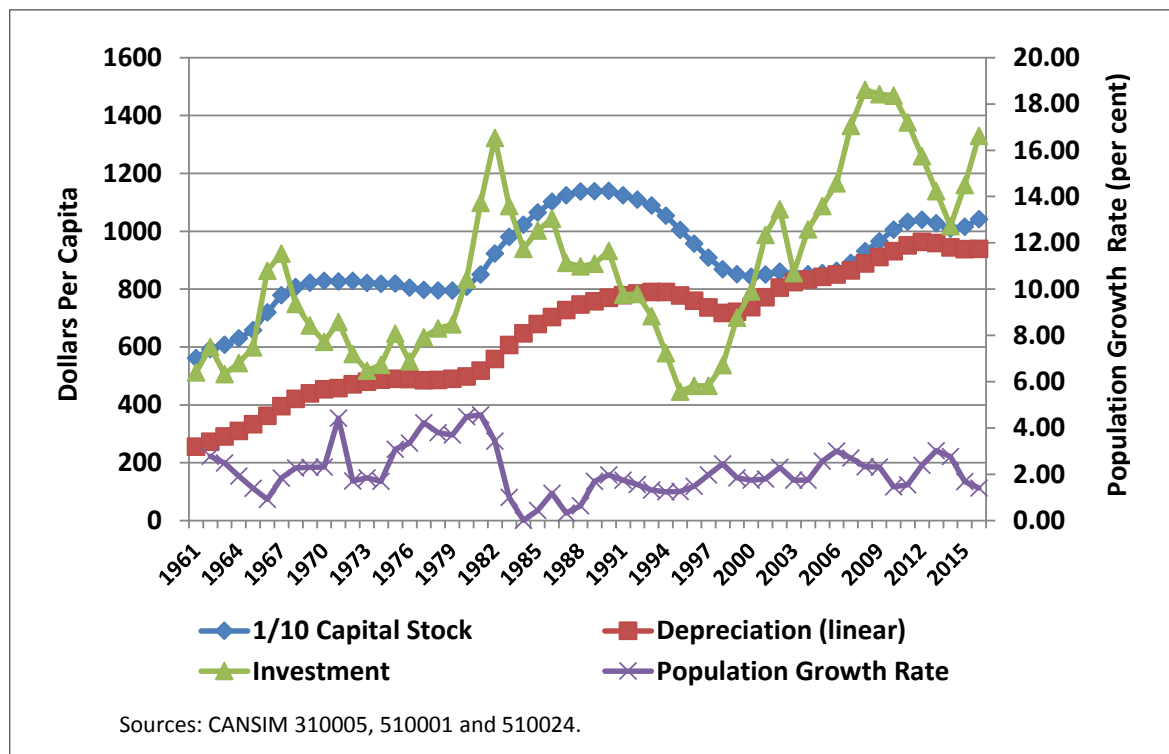
The trends in Alberta provincial government infrastructure investment and capital stock are reported in Figure 1. That figure shows the levels of real investment (in chained 2007 dollars), real net capital stock (for ease of comparison, converted to just one-tenth of the actual total), depreciation (linear), and the provincial population growth rates from 1961 to 2016 in Alberta.^{1,2}

Since 1961, population has increased in a relatively steady fashion, although at a rather high rate of about 2.8 per cent annually up to 1982 and then, after a distinct slump during the mid-1980s, at an average rate of almost 2.0 per cent from 1989 to 2016. In contrast, provincial investment has been highly variable, showing at least three distinct peaks and two distinct valleys and ranging from \$446 to \$1,489 per capita. The stock of provincial infrastructure follows a wave-like pattern. Most notable is the hump extending over the 1980s and 1990s, but there were run-ups during the 1960s and from 2006 to 2010, which seem to have established new plateaus. The high levels of investment during the 1980s and the dramatic disinvestment during the 1990s generated the hump. The swings in the Alberta government's infrastructure stock and investment since the 1970s have been substantial, and possibly concerning. Of particular significance is that for most of the 1990s, investment fell below depreciation and for several years was at the lowest levels during the study period — a feature that contributed to what many regarded as a subsequent infrastructure deficit.

¹ Investment and stock is non-residential. That, in the provincial government sector, is as reported in CANSIM table 310005 as indexed using chained 2007 dollars. The provincial government component is determined by subtracting from total government amounts those for defence services, other federal government services, other municipal government services and other Aboriginal government services.

² For comparison, the distribution of the net capital stock by type in Alberta in 2017 from CANSIM is similar to but somewhat different from that reported in Table 1 from the Alberta public accounts. The Statistics Canada data report buildings comprising 58.8 per cent, engineering 29 per cent, machinery and equipment 3.7 per cent, and intellectual property 8.5 per cent.

FIGURE 1 ALBERTA GOVERNMENT NET CAPITAL STOCK, INVESTMENT AND DEPRECIATION, PER CAPITA, CHAINED 2007 DOLLARS, 1961-2016



Municipal governments contribute significantly to public infrastructure within provinces and that should be acknowledged. It is also important to recognize municipal infrastructure because the provincial government makes major contributions towards municipal investments. From 1988 to 2008, provincial capital grants funded one-third of Alberta municipalities' capital spending and, from 2004 to 2008, grants covered 40 per cent.³ Figure 3 shows the real per person levels of municipal, provincial government and combined provincial and municipal government investment from 1961 to 2016. Municipal investment has averaged one-third of the total provincial and municipal investment but has recently grown in importance (and, at least up to 2005, was more stable than provincial government investment). Since 2005, municipal investments increased from about \$500 per person to over \$1,000 per capita (in real dollars) and, since 2010, they have essentially equalled the level of provincial government investment. As a consequence, the municipal share of the combined provincial and municipal capital stock has increased from one-third to almost one-half. Figure 4 shows the recent absolute and relative growth of the municipal per capita capital stock. As of 2016, the per capita capital stock of the municipal governments was \$9,981 and that of the provincial government was \$10,415. A resurgence of investment beginning in 2005 has led to higher per capita levels of provincial capital stock but also to an especially large increase in the capital stocks of Alberta's municipal governments.

³ Statistics Canada does not provide comparable data for more recent years. However, Alberta data indicate that provincial grants for capital amounted to 32 per cent of the cost of municipal capital purchased in 2016.

FIGURE 2 MUNICIPAL, PROVINCIAL AND COMBINED PROVINCIAL AND MUNICIPAL GOVERNMENT INVESTMENT, ALBERTA, PER CAPITA, CHAINED 2007 DOLLARS

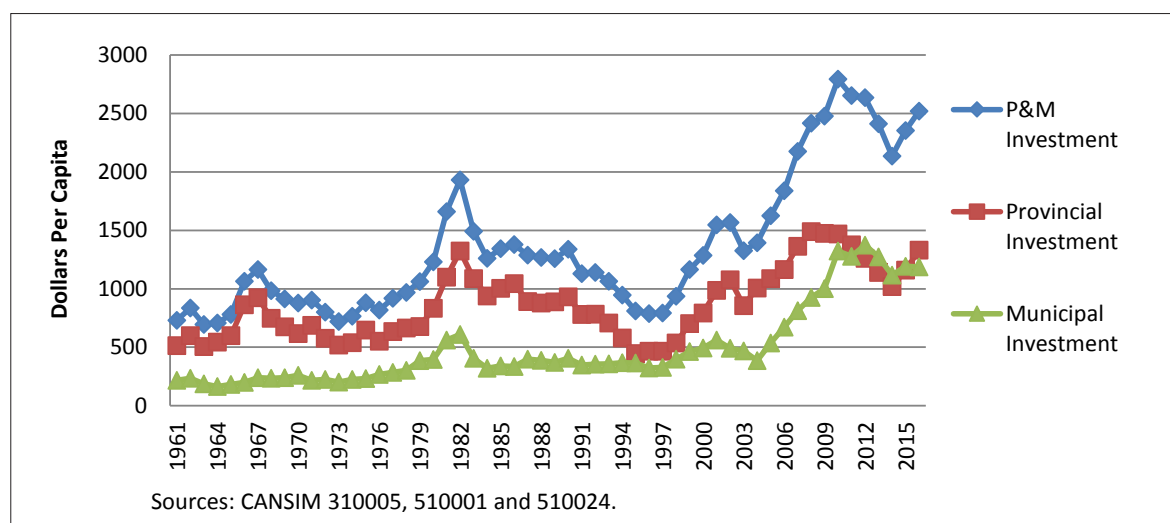
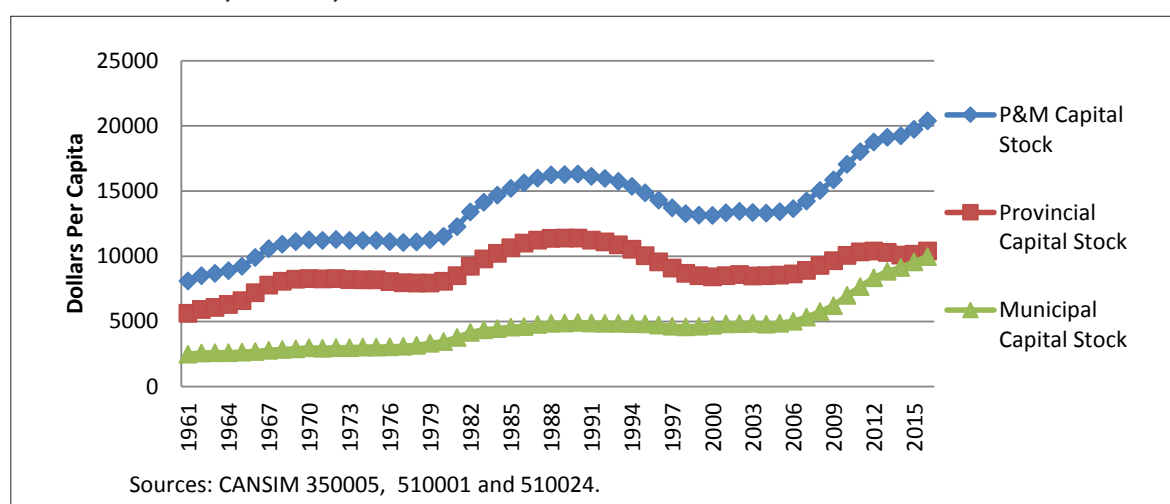


FIGURE 3 MUNICIPAL, PROVINCIAL AND COMBINED PROVINCIAL AND MUNICIPAL GOVERNMENT NET CAPITAL STOCK, ALBERTA, PER CAPITA CHAINED 2007 DOLLARS



4. PUBLIC INFRASTRUCTURE IN ALBERTA AND OTHER PROVINCES

Especially since the fall 2015 Alberta budget, there has been considerable interest in Alberta's infrastructure and its finance. Appended to the 2015–18 Strategic Plan of the October 2015 budget was a report by David Dodge, former governor of the Bank of Canada and now with Bennett Jones LLP, advising the government on its plans for capital spending and its finance. Notably, Dodge recommended expanded capital spending largely on the grounds that Alberta lacked sufficient infrastructure compared to other provinces — a recommendation that the Alberta government has followed to a considerable degree.⁴ In this section, I examine the contention that Alberta's infrastructure is insufficient. I do that first by comparing the per capita levels among

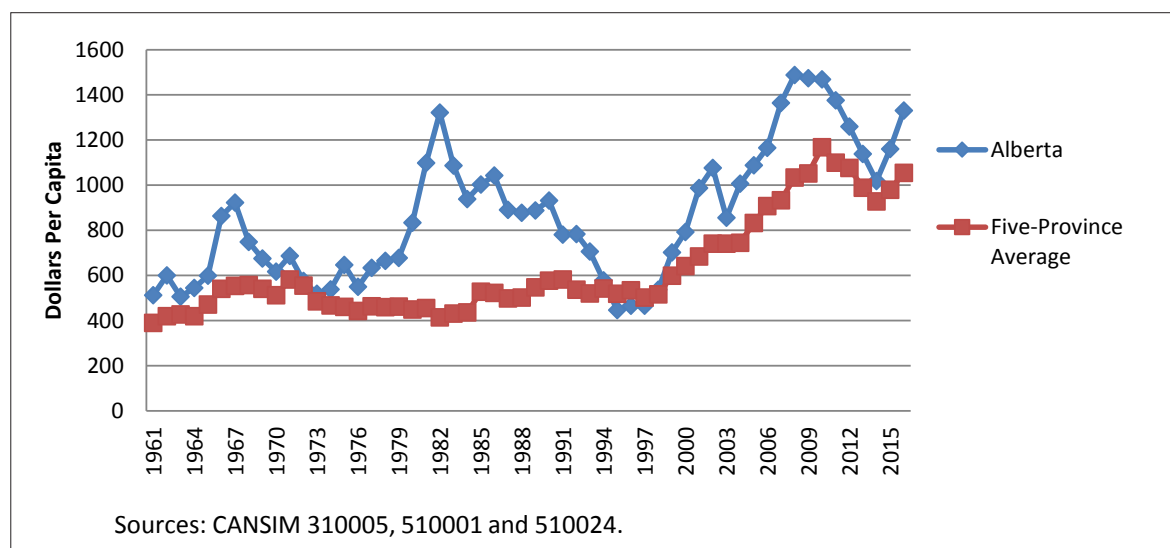
⁴ That the expanded capital spending program should largely be debt financed was also part of the Dodge recommendation. That recommendation and capital finance in general will be discussed later in this paper.

several provinces. As in the Dodge report, I compare Alberta to British Columbia, Saskatchewan, Manitoba, Ontario and Quebec.⁵ The results of the analysis suggest reasons to question the insufficiency claim. I then look more closely at Dodge's reason for arguing insufficiency, which is low provincial investment relative to GDP, and conclude that comparison to GDP is a questionable standard for interprovincial comparisons that include Alberta. An overview of the economic characteristics of the provinces indicates that Alberta is unlike the other provinces in important ways. The final part of this section reviews the results from some simple econometric models that were used to explore the determinants of capital-stock levels. Each undertaking is reported in turn.⁶

4.1. Per Capita Levels

The comparison of investment and net capital stock per person across the provinces indicates that Alberta has tended to invest more heavily and maintain a higher capital stock than the five other provinces. Figure 4 demonstrates this for investment. Obviously, per capita investment in Alberta has exceeded the five-province average in all but three years (1995–97).⁷ The difference overall is considerable: the 56-year average is \$866 for Alberta and \$626 for the five provinces. A natural consequence is that the per capita capital stock in Alberta exceeds that of the five-province average as shown in Figure 5. Indeed, the Alberta level exceeded that of any other province throughout.⁸ The 1980s–'90s bulge stands out, but the recent Alberta level remains about one-quarter larger, much the same as in the 1960s. In contrast, the average of the five provinces declined from \$6,772 in 1979 to \$6,008 in 1998 before climbing to \$8,475 in 2016.

FIGURE 4 PROVINCIAL GOVERNMENT PER CAPITA INVESTMENT: ALBERTA AND FIVE- PROVINCE AVERAGE, CHAINED 2007 DOLLARS, 1961-2016



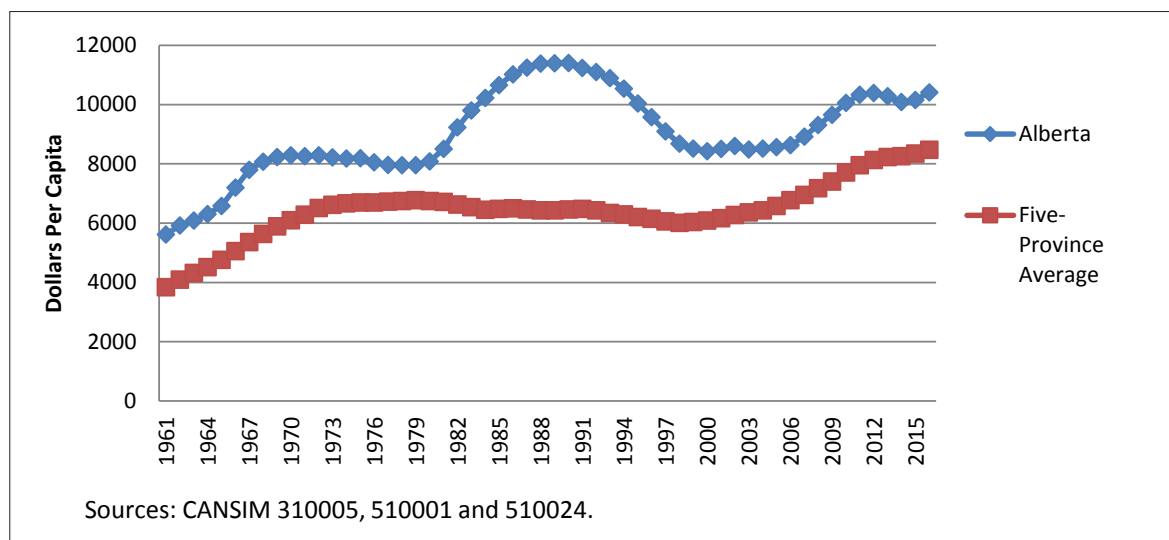
⁵ That is, comparisons are made with the two largest provinces and with Alberta's neighbours.

⁶ This portion of the paper updates and extends my earlier analysis of the Dodge report (McMillan 2015b).

⁷ Indeed, only occasionally has the level of investment in any province exceeded the level in Alberta.

⁸ There is one minor exception. The per capita stock in Saskatchewan did equal that of Alberta in 1979 and 1980. The Saskatchewan levels exceeded those of the provinces other than Alberta between 1971 and 2010. Stocks in Ontario are typically the lowest among the six provinces after the early 1970s.

FIGURE 5 PROVINCIAL GOVERNMENT PER CAPITA NET CAPITAL STOCK: ALBERTA AND FIVE-PROVINCE AVERAGE, CHAINED 2007 DOLLARS

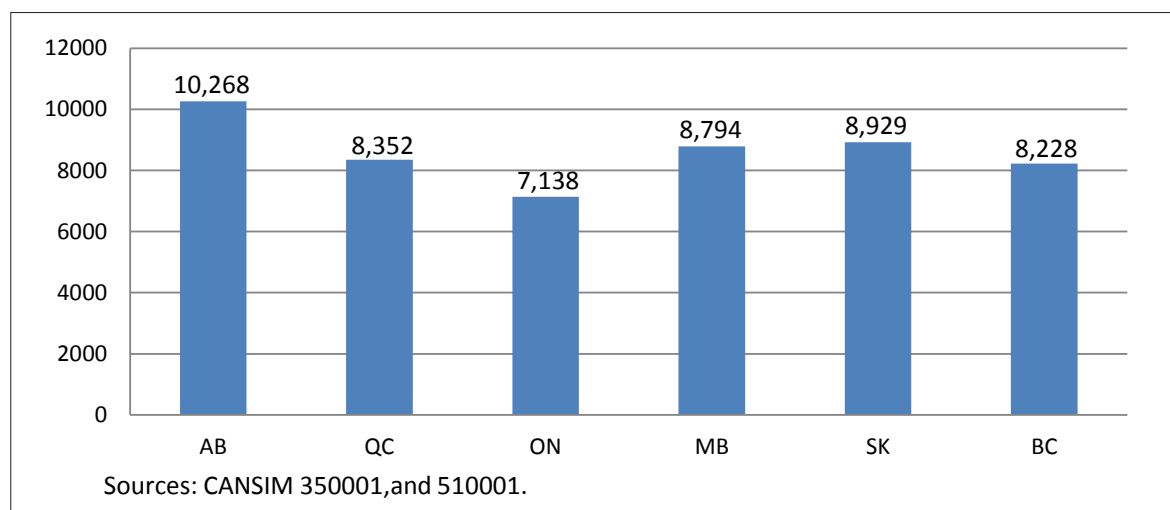


The five-province average masks the interprovincial variation. Figure 6 reports the average per capita net capital stock over the five years 2012 to 2016. Among the five provinces, that stock ranges from a low of \$7,138 in Ontario to \$8,929 in Saskatchewan.⁹ With the other provinces having stocks of over \$8,200 per capita, the low level in Ontario is notable. Alberta, on the other hand, stands out with a per capita stock of \$10,268. That level is 15-per-cent greater than the level in any other province, 24-per-cent larger than the five-province average, and 44 per cent over that in Ontario. Clearly, these data undermine the contention that Alberta lacks sufficient provincial capital relative to other provinces. Furthermore, if Alberta realized a capital stock of 16 per cent of GDP (the objective Dodge recommended), it would have a per capita level of \$12,089 which is 17.5-per-cent greater than the \$10,268 and 46-per-cent greater than the five-province average.¹⁰

⁹ The numbers here, and in McMillan (2015), for Manitoba and Saskatchewan are considerably lower than those reported in Dodge. The reason is that the Dodge numbers for those two provinces mistakenly included municipal as well as provincial net capital stocks.

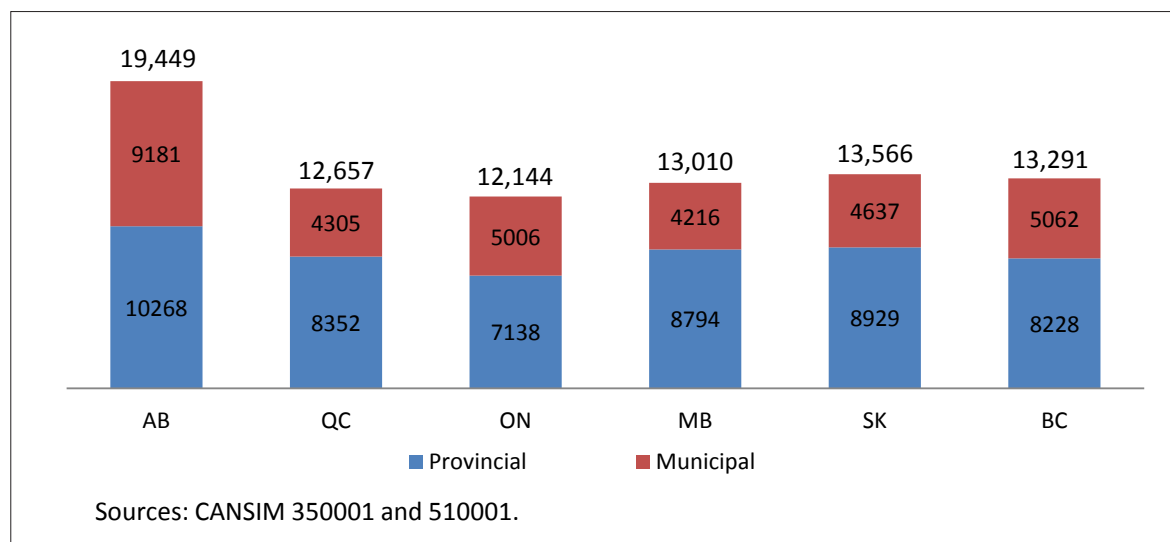
¹⁰ The structure of the Alberta government's capital stock (i.e., across buildings, engineering, machinery and equipment, and intellectual) parallels that in other provinces, with the possible exception of the intellectual-property share being somewhat lower.

FIGURE 6 PROVINCIAL GOVERNMENT NET CAPITAL PER CAPITA, 2012-2016 AVERAGE, CHAINED 2007 DOLLARS



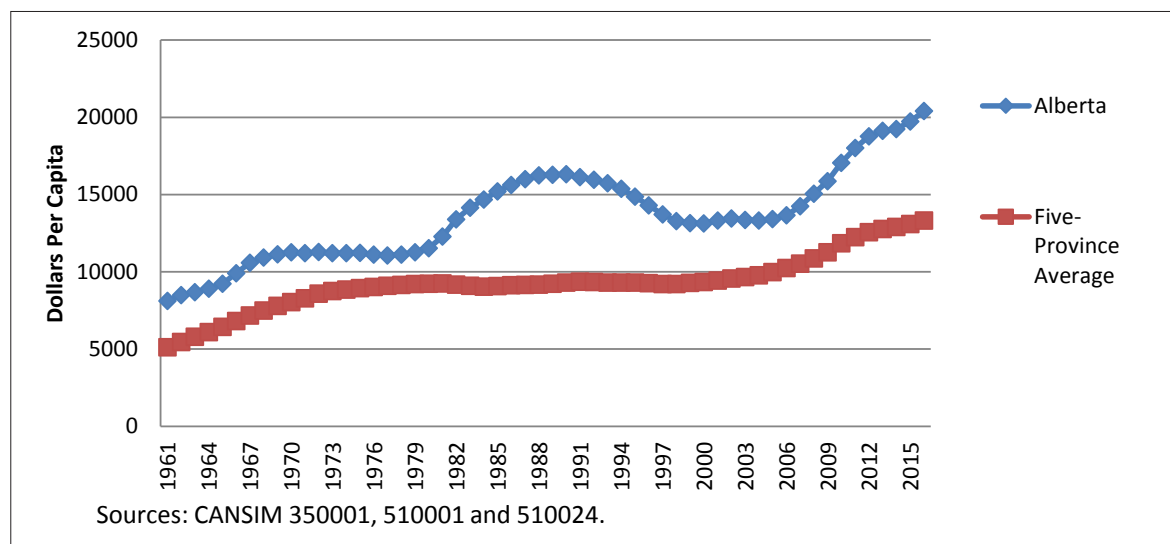
Considering municipal government capital as well as provincial capital expands the differential between Alberta and the other provinces. Figure 7 reports the provincial per capita stock (as above) plus the municipal government stock to show the 2012–16 average per capita combined provincial and municipal stock. Municipal capital adds significantly to the sub-national capital stock within a province. Over the five years 2012 to 2016, among the five other provinces, municipal capital contributes between 34 per cent (Quebec) and 41 per cent (Ontario) of the combined municipal and provincial government capital while, in Alberta, it represents 47 per cent. The inclusion of municipal capital reduces the differences among the other provinces — primarily by increasing the subnational government stock in Ontario. Although Ontario still remains the lowest and Manitoba the highest among the five, the range (high less low) for the provincial plus municipal stock is \$1,422 as opposed to \$1,791 for the provincial stock only (a difference relative to the averages of 11 per cent rather than 22 per cent). Again, Alberta stands out as the province with the highest provincial (\$10,268), municipal (\$9,181) and combined (\$19,449) capital stocks of the six provinces. Incorporating municipal capital magnifies the extent of the per capita capital-stock premium in Alberta. Alberta's total of \$19,449 is 50-per-cent larger than the five-province average of \$12,933 (compared to 24 per cent for provincial government capital).

FIGURE 7 PROVINCIAL AND MUNICIPAL NET CAPITAL STOCK PER CAPITA, 2012-16 AVERAGE, CHAINED 2007 DOLLARS



Alberta has consistently had a larger municipal-plus-provincial per person capital stock than the five provinces since 1961 (see Figure 8). The difference expanded during the 1980s and declined in the 1990s, decreased somewhat more until 2005, before expanding considerably thereafter. The recent growth in the Alberta difference can be attributed largely to growth in the municipal share in Alberta (e.g., compare Figure 8 with figures 5 and 3). Real per capita municipal capital has doubled since 2005 and the municipal share has increased from 36 to 49 per cent in that time. The municipal share has grown in only two of the other five provinces (in Manitoba and Saskatchewan and from about 28 to 34 per cent). In the other three provinces, the municipal share has been essentially stable since 2005.

FIGURE 8 COMBINED PROVINCIAL AND MUNICIPAL GOVERNMENT NET CAPITAL STOCK, PER CAPITA, CHAINED 2007 DOLLARS, 1961-2016



The evidence indicates clearly that Alberta's government capital stock is relatively large and that that difference has persisted since (at least) 1961. The real per capita capital stock in Alberta at both the provincial and the municipal levels has consistently exceeded that in the other five provinces. Hence, looking at the data on a per capita basis definitely raises questions about any insufficiency of government capital in Alberta.

4.2. Government Capital Relative to GDP

Dodge concluded that the Alberta government's investment and capital stock was deficient by comparing investment and capital stock relative to GDP in Alberta and the other five provinces (British Columbia, Saskatchewan, Manitoba, Ontario and Quebec). For example, over the 20 years he analyzed (1994–2013), the average investment was 1.48 per cent of GDP in Alberta while the (weighted) average in the other five provinces was 1.98 per cent. And, in 2013, real net provincial capital stock as a percentage of GDP was the lowest in Alberta at 14.2 per cent, while in the other provinces it ranged from 16.0 per cent in Saskatchewan to 21.8 per cent in Manitoba.

It is useful to look at provincial investment and capital stock relative to GDP over a longer period. Figure 9 shows provincial government investment as a percentage of GDP for Alberta and the five-province average from 1961 to 2016. Indeed, by this measure, investment in Alberta has been below the five-province average since the early 1990s. Prior to that, Alberta's investment was about or above the average.¹¹ Capital stock as a percentage of GDP is reported in Figure 10. For most years since 1973, the beginning of a major energy boom in Alberta, Alberta's capital stock has been a smaller percentage of GDP than that for the five-province average. The only time since then during which the Alberta level reached (or slightly exceeded) the average was from about 1983 to 1994, a time when Alberta was in the top of its capital bulge and had real per capita capital stocks exceeding even recent levels. That is, other than for a period of exceptional investment and capital-stock levels, Alberta's capital stock to GDP has been below the five-province average (and typically below that of any other province) since the energy boom emerging in 1973.^{12, 13} Of further note in Figure 10 is the 30-year declining trend in provincial (and subnational infrastructure), a feature that attracted attention and concern.¹⁴

¹¹ Percentages are calculated using real chained 2007 dollars. Real dollar values by province for GDP extend back only to 1980. Prior values were calculated using the Canadian implicit price index for GDP.

¹² A graph for combined provincial and municipal net capital stocks follows a similar pattern but for the Alberta level approaching the five-province average after 2009 and actually reaching the average in 2016.

¹³ Up until 2003, it is actually Ontario that normally had the lowest provincial government capital stock as a percentage of GDP.

¹⁴ The Federation of Canadian Municipalities has been a major advocate of increased spending on (especially municipal) infrastructure.

FIGURE 9 PROVINCIAL GOVERNMENT INVESTMENT AS A PERCENTAGE OF GDP, 1961-2016

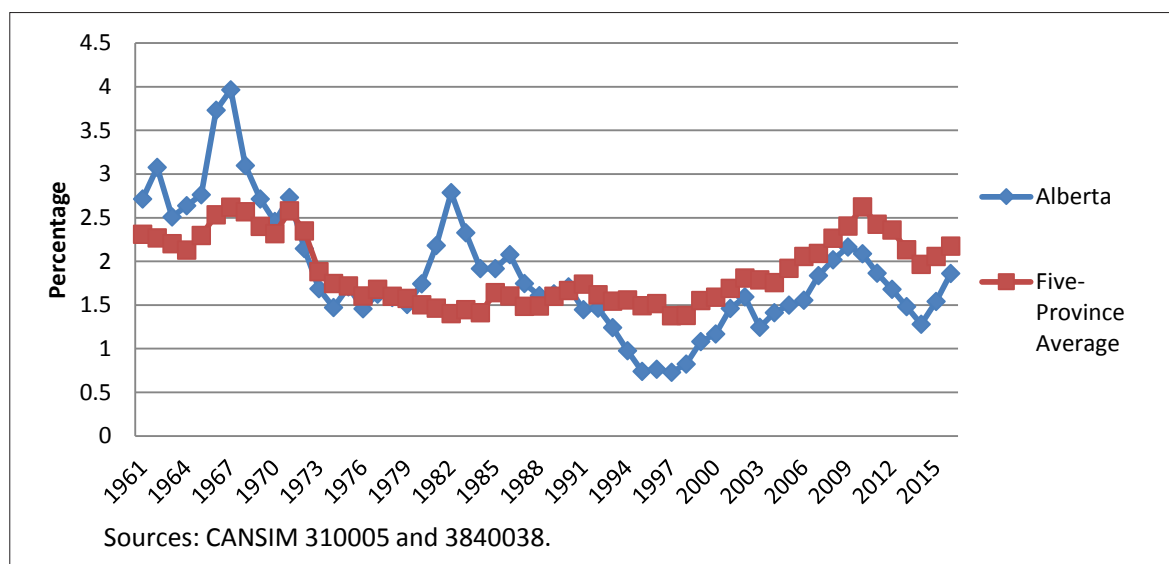
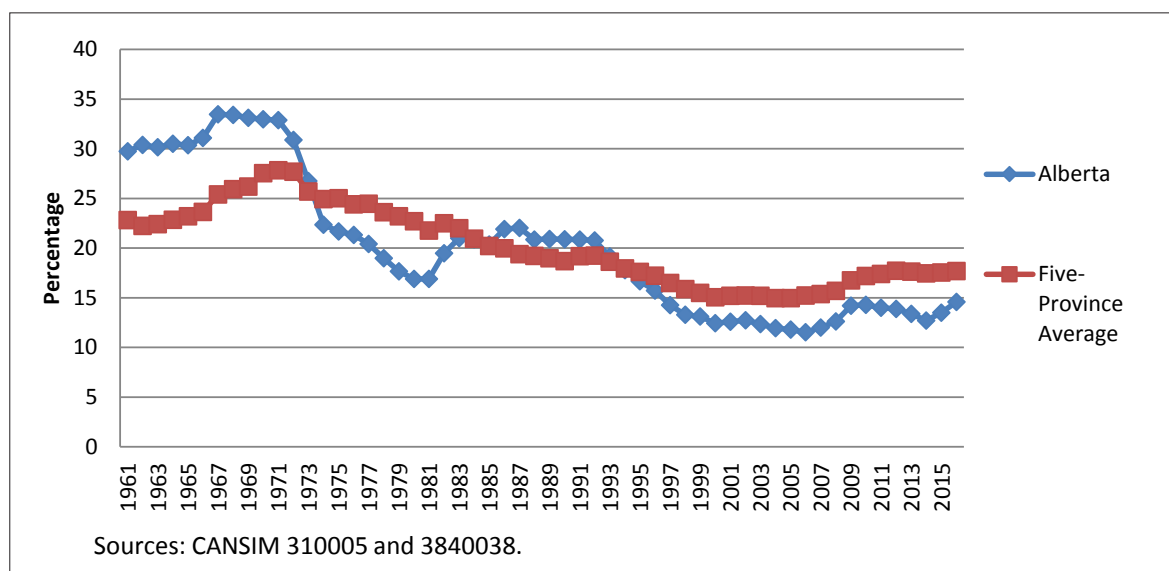


FIGURE 10 PROVINCIAL GOVERNMENT NET CAPITAL STOCK AS A PERCENTAGE OF GDP, 1961-2016



Alberta's provincial capital stock has been a smaller percentage of GDP than that in the five provinces since the early 1990s and typically smaller since the 1973 energy boom. Yet, Alberta's per capita real net capital stock exceeds and has consistently exceeded that in the other five provinces. These diverging indicators present a conundrum especially as they may suggest conflicting recommendations for provincial government investment. This puzzle is explored next.

4.3. Is Alberta Different?

The lingering difference between indicators of the adequacy of Alberta's public capital raises the question of what the appropriate standard of comparison among provinces is. Is it public capital stock relative to population, or relative to GDP, or neither, or both, or something else? A closely related question is: is Alberta different? Table 2 provides various measures that, for our purposes,

serve to characterize the six provinces. Recent values of those indicators are provided and also their 1990 to 2016 averages. The recent values are for both 2013 and 2016.¹⁵ The reason for those two is that 2013 was, as comparison with the 1990–2016 averages confirms, more characteristic of the long-term pattern, while 2016, which was during the recession that followed the collapse of oil prices in 2014–15, demonstrates the sensitivity of Alberta’s economic conditions to the state of the energy sector. The discussion will look at the 2013 data and the 1990–2016 averages and then reflect briefly on the changes occurring between 2013 and 2016.

For ease of comparison, the provincial government sector real net capital stock per capita in 2013, previously reflected in Figure 6, is provided in the first line of the table. The provincial capital stock as a percentage of GDP follows. These are the two measures that are the focus of the above discussion. As has been observed, the per capita amount for Alberta is relatively large while the percentage of GDP is relatively low (for both 2013 and the long-term average).

Turning to the other indicators, GDP per person is and has been much higher in Alberta. Both in 2013 and from 1990 to 2013, GDP per capita has been about 63-per-cent larger in Alberta than the five-province average. Note too, however, that the GDP levels are most similar among Ontario, Manitoba and British Columbia, with Quebec trailing somewhat. Also note that Saskatchewan (which, like Alberta, is a resource-oriented economy), is noticeably above the levels in the other four provinces.

The distribution of factor incomes also varies among the provinces. Approximately 50 per cent is paid as compensation to employees in Quebec, Ontario, Manitoba and British Columbia but that share is notably smaller in Alberta, at about 46 per cent, and even lower (averaging about 40 per cent) in Saskatchewan. Corporate net operating surpluses as a percentage of GDP have the opposite pattern. The figure is lowest in Quebec, Ontario, Manitoba and British Columbia (averaging in the 10- to 13-per-cent range since 1990) and is larger in Alberta and Saskatchewan at about 20 per cent (with a particularly strong showing at 27.5 per cent in Saskatchewan in 2013).

Wide differences in the non-government capital stock among provinces are a reason for the differences in the distribution of factor incomes. Non-government, non-residential net capital stock per person is greatest in Alberta at \$143,783 in 2013 and lowest in Quebec and Ontario at approximately \$27,650 per capita. The levels in Manitoba and British Columbia are next largest at \$36,704 and \$42,597 respectively. The level in Saskatchewan, at \$89,851, sits well below Alberta but well above the other four provinces.

¹⁵ The 2013 data reported here have been updated with the latest numbers and so may differ marginally from those reported in McMillan (2015b).

TABLE 2 PROVINCIAL CHARACTERISTICS

	2013 Value ^a (above) & 2016 Value (below)					
	AB	QC	ON	MB	SK	BC
Provincial Govt Sector Capital Stock (2007\$ chained)	10283 10415	8321 8445	7111 7229	8805 8897	8663 9595 ^b	8235 8211
Provincial Govt Sector Capital Stock as % of GDP (both 2007\$ chained)	13.4 14.5	20.6 20.5	15.3 14.8	19.5 19.4	15.4 17.6	17.4 16.2
GDP Per Capita (2007\$ chained)	76,863 71,469	40,389 41,248	46,613 49,012	45,176 45,857	56,281 54,442	47,239 50,618
Compensation of Employees as % of GDP	47.0 51.2	53.0 52.8	53.5 52.3	49.3 49.8	36.8 42.4	49.9 48.7
Corporate Net Operating Surplus as % of GDP	18.6 4.8	11.6 11.8	12.2 13.6	14.1 12.0	27.5 13.3	10.1 11.1
Non-Govt, Non-Residential Net Capital Stock Per Capita (2007\$ chained)	143,783 148,671	27,671 27,458	27,637 28,096	36,704 40,168	89,851 96,671	42,597 43,346
Household Income Per Capita (nominal \$)	56,510 56,088	40,178 43,377	43,801 47,743	40,091 43,050	47,256 48,698	44,249 48,828
Household Income as % of GDP (nominal \$)	66.0 75.4	89.8 91.4	85.4 83.9	81.4 83.6	62.8 74.3	88.7 88.1

	1990-2016 Average					
	AB	QC	ON	MB	SK	BC
Provincial Govt Sector Capital Stock (2007\$ chained)	9645	6279	5763	6996	8233	7140
Provincial Govt Sector Capital Stock as % of GDP (both 2007\$ chained)	14.5	17.2	13.4	18.2	17.8	17.2
GDP Per Capita (2007\$ chained)	67,430	36,312	43,064	38,459	47,239	41,628
Compensation of Employees as % of GDP	46.0	52.3	53.0	49.9	40.3	51.1
Corporate Net Operating Surplus as % of GDP	19.1	11.8	11.3	12.9	20.8	10.0
Non-Govt, Non-Residential Net Capital Stock Per Capita (2007\$ chained)	108,493	26,687	28,471	31,960	63,427	36,389
Household Income Per Capita (nominal \$)	38,931	30,435	34,673	29,469	30,973	33,555
Household Income as % of GDP (nominal \$)	70.3	89.1	85.1	84.5	73.0	88.3

Note: a) 2013 values are updated from McMillan (2015b) using the latest data. b) The 2016 value appears to be an anomaly in the capital stock data as the value for 2015 is \$8,981.

Interprovincial differences in per person non-government net capital stock do not necessarily translate into parallel differences in residents' incomes. In 2013, and also since 1990, household per capita incomes were relatively similar across the five provinces other than Alberta. In 2013, incomes ranged from \$40,178 to \$47,256 but incomes and non-government capital stock ranked differently. Also, relative incomes shifted over time. At \$56,510 per person in 2013, household income was substantially higher in Alberta — almost one-third greater than the five-province average. That was not always the case. Incomes in Alberta began to diverge from the pack at the turn of the century with a recovery in the energy sector.¹⁶ The 1990 to 2016 average for Alberta is only about 22 per cent above the five-province average rather than 33-per-cent larger as in 2013. Note too that per capita household income in Saskatchewan in 2013 was the highest of the five provinces, but its 1990 to 2016 average was below average (and the average from 1990 to 2013 was the lowest). Incomes in Saskatchewan surged after 2007.

¹⁶ Only Ontario experienced higher per capita incomes than Alberta did from the mid-1980s and through the 1990s.

Household incomes also differ as a percentage of GDP. Household income is typically in the 85-to-90-per-cent range in Quebec, Ontario, Manitoba and British Columbia, but at considerably lower levels in Alberta and Saskatchewan (i.e., the low 70s). In 2013, the percentage in Alberta was 66 and in Saskatchewan it was 62.8.¹⁷

The 2014–15 drop in oil prices had a substantial, adverse impact on the Alberta economy — an impact that results in some of the 2016 figures not being representative of the longer-term situation in the province. Per capita real GDP in Alberta (and Saskatchewan) fell between 2013 and 2016 (by seven per cent) while it increased in Ontario, Quebec, Manitoba and B.C. Employee compensation as a percentage of GDP in Alberta rose to exceed (rather than be below) the five-province average. Corporate net operating surplus was especially hard hit, falling from 18.6 per cent of GDP to 4.8 per cent — much below the five-province average of 12.4 per cent. (Note also the sharp declines in employee compensation and corporate net operating surpluses in Saskatchewan.) Nominal per capita household income declined in Alberta between 2013 and 2016 but increased in the other provinces (including Saskatchewan). Despite the drop, per capita household income in Alberta remained 21-per-cent above the average, but down from 31-per-cent greater in 2013. Despite the drop in household income, household income increased as a share of GDP in Alberta (and Saskatchewan). In Alberta it increased from 66 to 75.4 per cent of GDP, but still is relatively low compared to the 84.3-per-cent five-province average (an average that includes the increased percentage of 74.3 in Saskatchewan). While the recession had large impacts on certain indicators (notably per capita GDP, per capita household incomes, employee compensation and corporate operating surpluses), those impacts are likely to have been the most negative in 2016, although there is expected to be some moderation of those differences over time. Regardless, Alberta has unique characteristics.

Table 2 demonstrates that the Alberta economy is different in some rather important ways from those of the other five provinces and, particularly, Quebec, Ontario, Manitoba and British Columbia. Albertans work with large amounts of private sector capital, produce a high level of GDP per person and, particularly over the past 20 years, earn high incomes (despite incomes being a lower share of GDP). The Dodge report acknowledges this (page 16), but apparently believes that those differences should not modify the percentage of GDP that provincial government capital should be and recommends that Alberta meet the 16-per-cent benchmark that is the weighted average of the five other provinces. Dodge notes, “...real economic activity per capita is far more intense in Alberta than in the other provinces and public capital has not kept pace with this activity to the same extent as in the other provinces over the past 20 years.” One expects that public capital would increase in parallel with population but is it to be expected that it should increase proportionately with output per capita? Do more productive workers need proportionately more public infrastructure?¹⁸

¹⁷ Saskatchewan too does not quite parallel the other provinces, including Alberta.

¹⁸ While it is true that the provincial capital stock as a percentage of GDP has declined relative to the five-province average over the past 20 years (see Chart 4 in the Dodge report), that decline may not represent a serious deterioration in its productive contribution. Rather, the high percentages observed in the mid-1990s may represent the tailing off (due to deterioration of economic and fiscal conditions) of the large increase in capital spending that followed the 1970s energy boom and that saw the provincial capital stock climb to almost 23 per cent of GDP in the mid-1980s.

4.4. Some Econometric Explorations

In an effort to obtain a better understanding of the determinants of the levels of public capital, some simple econometric explorations were undertaken. The basic model seeks to explain provincial government capital stock per capita or as a percentage of GDP with population, population growth rate, real GDP per person and real household income per person as the potential explanatory variables. In addition, some variables characterizing provincial governments' fiscal situations were included. Data cover 1981 to 2016.¹⁹ The following summarizes what appear to be robust results from numerous regressions. Illustrations are provided in Appendix A.

First, Alberta is definitely distinct from the other five provinces. Saskatchewan, too, seems distinct. Indeed, models estimated for Alberta and Saskatchewan combined and for the four other provinces together (Quebec, Ontario, Manitoba and British Columbia) perform well. These results suggest that the four- (not five-) province group is a more homogeneous group for comparison. Even so, the results also suggest that decisions on provincial capital stock have been different in Alberta than in the other (and especially the other four) provinces over the period examined. This implies, based on the decisions made over 36 years, that the levels per capita or as a percentage of GDP elsewhere may not be applicable to Alberta.

A second interesting result relates to the role of GDP per person. Per capita GDP allows for the “real economic activity per capita” that the Dodge report emphasizes. Included here also is real household income per capita — included to reflect differences in household income to GDP among the provinces and to reflect the possible impact of residents' income on demand for (and possibly the cost of) provincial capital stock. Despite being correlated, both GDP and household income per person have (highly) significant coefficients. Particularly interesting is that the coefficient of GDP per capita is negative while that for household income per person is positive. This indicates that the level of provincial government capital stock per person increases as household income becomes larger but, after controlling for income and other factors, the level is reduced as GDP per person increases.^{20, 21} These results suggest that GDP per person is itself not a good predictor of the levels of public capital stock. Determination of the levels is more complex and including both household income per person and GDP per person results in superior model performance (predictive power) and suggests that it is household income per person (not GDP per capita) that is the main (positive) driver of the levels of provincial capital stock (both differences among the provinces and trends

¹⁹ This period covers the full extent of the Statistics Canada series (Table 3840038) for GDP in chained 2007 dollars.

²⁰ This feature exists also in regressions covering only the four most homogenous provinces (i.e., British Columbia, Manitoba, Ontario and Quebec) so it is not a consequence of including Alberta and Saskatchewan (or just Alberta).

²¹ In regressions on provincial capital as a percentage of GDP, the coefficient of the GDP variable tends to be somewhat larger than that of the household-income variable. In regressions on per capita provincial capital, the household-income coefficient exceeds that of the GDP variable.

over time).²² This outcome persists whether the estimates are made across all six provinces, the other five provinces, the four provinces excluding Alberta and Saskatchewan or for Alberta and Saskatchewan.^{23, 24}

The examination of the data in Table 2 plus the econometric explorations offer some cautionary insights. Alberta is different and comparison of its provincial capital stock levels with those of other provinces based on GDP may not be all that informative. The determination of public capital stocks is more complex than simply the relationship to GDP. Hence, setting an objective of provincial capital stock equal to 16 per cent of GDP because that is the average of the level in five other provinces is probably an imperfect and unreliable benchmark.²⁵

5. CAPITAL FINANCING: LONG-RUN IMPLICATIONS OF DEBT FINANCING

The Dodge report recommended that the Alberta government increase the net capital stock of the provincial government sector to 16 per cent of GDP (a long-term benchmark seen as characterizing the five other provinces) by 2019–20. Reaching and sustaining the 16-per-cent level into the future requires an extended commitment to considerable capital expenditure. Based on working assumptions (page 29 of the Dodge report) and simulations provided by Alberta Treasury Board and Finance, Dodge projected the public finance implications of the expanded capital program under four oil-price scenarios. For each oil-price scenario, and assuming (particularly) that the province's non-resource revenues remain a constant portion of GDP, the simulations projected significant increases in the provincial debt in all four cases. Taking the low-to-mid oil-price scenario (i.e., low to 2019–20 and mid from then to 2024–25) as the preferred option (i.e., “probably the one that best balances the risks,” page 24), Dodge projected that “...net debt would stabilize about to 25 percent of GDP by the mid-2020s...” (page 30). The shift from a net financial asset position (which peaked at 15 per cent of GDP in 2007–08) to a net debt position leveling off at about 25 per cent of GDP has significant implications for the province's fiscal situation.²⁶

²² It has been suggested that these results might be due to combining quality-of-life and productivity-enhancing provincial capital. That is, productivity-enhancing infrastructure might be better explained by GDP and quality-of-life infrastructure by household income. As Table 1 indicates, most of the provincial capital is devoted to highways, health and education. Certainly that capital contributes to both productivity and quality of life. Even roads, which might be expected to be most closely related to productivity and GDP, have a quality-of-life component. The separation of productivity-enhancing and quality-of-life capital seems problematic and is left for future study.

²³ Population and population change were included in the econometric specification but are of little interest to the theme of the discussion. Also, those results are not very informative. For completeness, however, mention is made here. Including population allows for possible economies of population size. The coefficient of population is typically significant but the sign depends upon the specification and the method of estimation. Population change was not expected to play much of a role in explaining capital stock, and its coefficient is normally not statistically significant except in fixed-effects estimation.

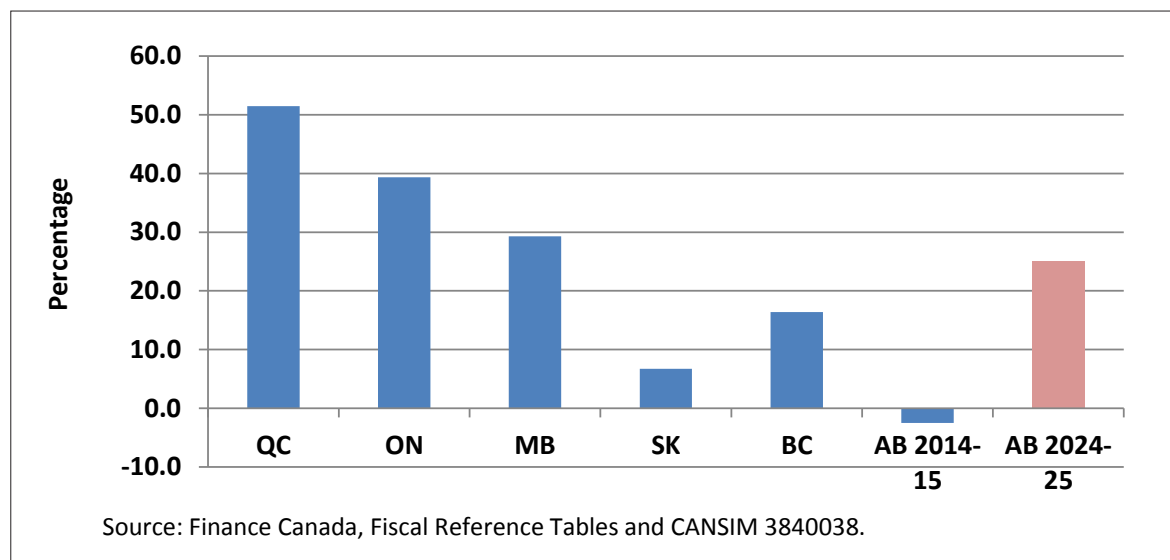
²⁴ Adding provincial government fiscal variables contributed relatively little to the explanatory power of the regressions. Included were the per capita levels of investment income, transfers, interest expenditures and surplus/deficit. The most consistent outcome was that larger transfers were associated with higher levels of capital stock. Considerable collinearity exists among the variables, including with GDP and household incomes. Fiscal variables did, however, perform better in some exploratory regressions to explain annual provincial investments in capital stock. For discussion and illustrations of those regressions see Section 6 and Appendix B.

²⁵ A provincial government's capital expenditures are the product of a capital plan encompassing a large number of individual projects being undertaken in an environment of an existing infrastructure. The merits of those projects should be individually assessed and pass a social benefit-cost standard to warrant inclusion in the plan. Thus, capital spending is, or should be, the product of a myriad of (presumably well-made) micro decisions and not the result of pursuing some arbitrary macro benchmark. Dodge acknowledges the micro fundamentals but anticipates that the investments necessary to achieve the 16-per-cent benchmark would meet such a social rate-of-return standard.

²⁶ Chart 11 of the Dodge report illustrates the changes.

Dodge considered provincial net debt at 25 per cent of GDP “moderate” by provincial standards and pointed to the then current (2014–15) levels in Quebec (51 per cent), Ontario (39 per cent) and British Columbia (16 per cent).²⁷ To complete the comparison, the 2014–15 levels of net debt to GDP are shown for the six provinces in Figure 11 along with the projected level for Alberta in 2024–25. By this standard, a net debt level of 25 per cent appears not unreasonable.²⁸

FIGURE 11 NET DEBT AS A PERCENTAGE OF GDP, 2014-15



There is a problem with the Dodge proposal. While net debt of 25 per cent of GDP may appear moderate compared to other provinces, GDP is a questionable standard for comparison. Provincial governments differ considerably in their size relative to their economies. To demonstrate, Table 3 reports the total revenues of the six provinces relative to their GDPs for 2016–17. The percentages range from 13.5 per cent in Alberta to 25.9 per cent in Quebec. Alberta has the smallest provincial government relative to its economy with a level only 65 per cent of the average of the other five provinces. Despite these differences, total revenues per capita are fairly similar. The average across the six provinces is \$11,016 per person with a range from \$9,893 in Alberta to \$12,207 in Quebec.²⁹ Thus, it is argued that debt relative to provincial revenues is a valuable alternative measure, and (because it reflects the burden on provincial taxpayers) a more appropriate indicator, of a province’s capacity to bear debt.

²⁷ See page 19 and Chart 8 in the Dodge report.

²⁸ In addition, being unique among provinces in having positive net financial assets, Alberta has (as Dodge points out, page 19) “...prudent room for net borrowing...”

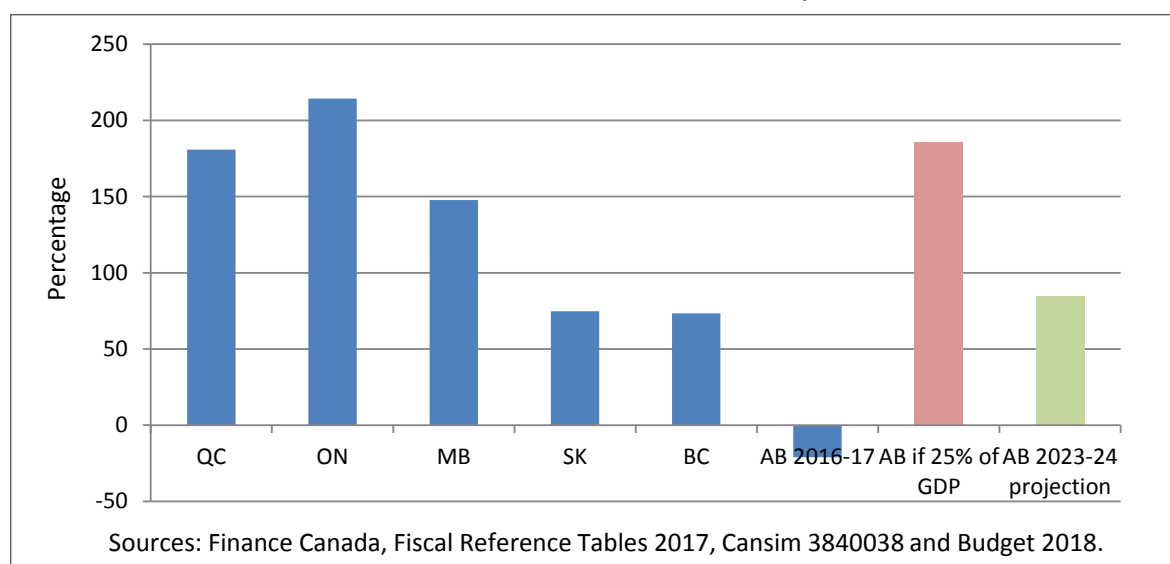
²⁹ The situation for Alberta changed substantially between 2014–15 and 2016–17 due to the oil-price collapse and the accompanying recession. Total revenues fell from \$49.5 to \$42.4 billion and the province went from a \$1.1-billion surplus to a \$10.8-billion deficit. Per capita revenue dropped by \$2,023 (with 71 per cent of that caused by the drop in resource revenues). Despite the drop in revenue and the move into deficit, revenues as a percentage of GDP increased from 12.1 per cent to 13.5 per cent between 2014–15 and 2016–17. Levels for 2014–15 are reported in McMillan (2015b).

TABLE 3 PROVINCIAL GOVERNMENT TOTAL REVENUE AS A PERCENTAGE OF GDP AND PER CAPITA, 2016-17

	QC	ON	MB	SK	AB	BC
As % of GDP	25.9	17.7	23.1	18.1	13.5	19.5
\$ Per Capita	12,207	9,915	11,690	11,707	9,893	10,682

Source: Finance Canada, Fiscal Reference Tables, 2017.

Using provincial government revenues rather than GDP as the base provides quite a different perspective on the magnitude of provincial debt and a province's ability to finance that debt. Figure 12 shows the 2016-17 level of net debt as a percentage of total revenues for the six provinces. Quebec and Ontario stand out in that their net debt is 181 and 214 per cent respectively of provincial revenues. Net debt is lower in Manitoba at 148 per cent and the magnitudes in Saskatchewan and British Columbia are notably lower at about 74 per cent. In 2016-17, Alberta still had net financial assets (i.e., negative net debt). The Dodge report outlined a largely debt-financed capital program leading to debt stabilizing at 25 per cent of GDP as of 2024-25. Were Alberta now to have net debt equal to 25 per cent of GDP, Alberta's net debt would amount to 186 per cent of provincial revenues.³⁰ That would be a level of debt comparable to those in Quebec and Ontario, neither of which is in an enviable position and, as to be expected, the bond ratings of which (along with those of Manitoba) are below those of the other three provinces. Looked at in this context, a debt burden of 25 per cent of GDP seems less moderate and much less appealing than implied in the Dodge report (or as in other comparisons to GDP such as in Budget 2018, page 11).

FIGURE 12 PROVINCIAL NET DEBT AS A PERCENTAGE OF TOTAL REVENUE, 2016-17

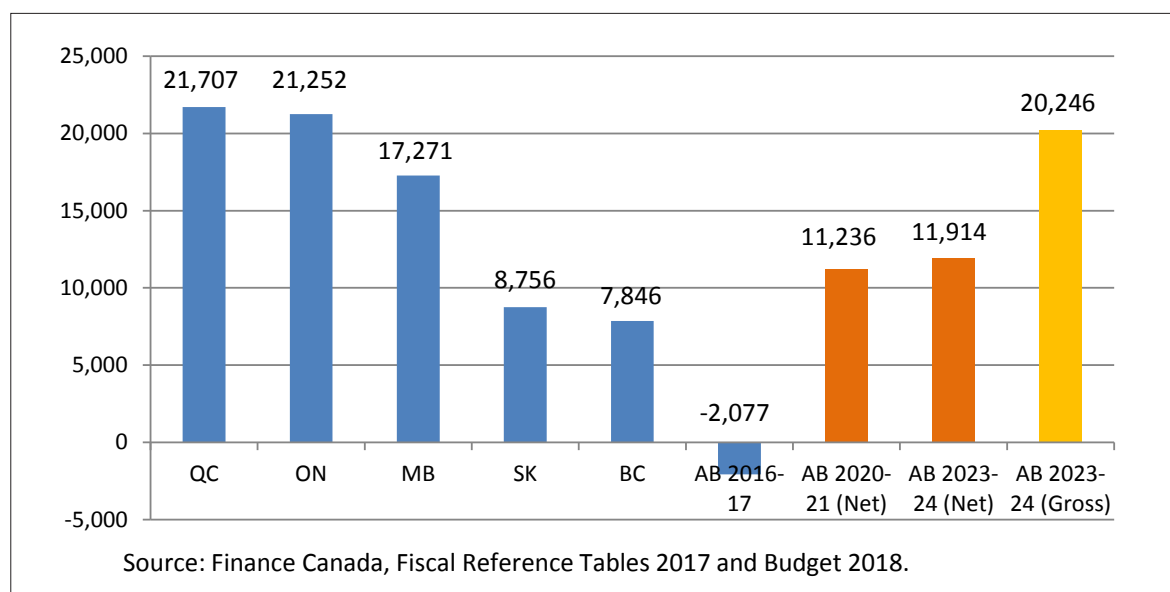
The Alberta government has not followed the Dodge recommendations in full. In its October 2015 budget, the province did expand the government's capital spending (investment) program by 15 per cent. Over the next three fiscal years the province spent \$22.4 billion rather than its planned \$22.2 billion, although not entirely according to the initial schedule. The three-year augmentation of capital spending was (following Dodge) largely a counter-cyclic measure to reduce the impacts of the recession. Now that the economy is gradually improving, the province is scaling back its capital program. Budget 2018 reports planned capital expenditures of approximately \$6 billion

³⁰ If the calculation were done using 2014-15 (updated) data, the percentage would, at 190 per cent, be almost the same.

annually over the next five years.³¹ The capital plan to 2023–24 is more modest than what Dodge suggested and borrows much less. While Dodge recommended reaching balance in 2024–25 with net debt at 25 per cent of GDP, the Budget 2018 plan is to realize a balanced budget in 2023–24 with net debt at approximately 12.3 per cent of GDP (which is about 85 per cent of Alberta’s projected revenue; see Figure 12). Net debt at 85 per cent of total revenue could be considered moderate relative to the other provinces but it is only so when at about one-half the 25 per cent of GDP level that Dodge recommended.

Another perspective on net debt levels comes from considering them in per capita terms. The per capita levels in 2016–17 across the six provinces are reported in Figure 13. Net debt per capita is greatest in Quebec and Ontario at \$21,707 and \$21,252 respectively, but it is also high in Manitoba at \$17,271. In Saskatchewan and British Columbia it is much less, at \$8,756 and \$7,846 respectively. Alberta still had net assets (negative net debt) of \$2,077 per person. The picture in Alberta is changing rapidly. By 2020–21, net debt is expected to be \$11,236, but it is expected to increase only modestly to \$11,914 when the budget is planned to balance. These levels put Alberta about midway in the provincial per capita net-debt ranking. Alberta is fortunate to have a substantial holding of financial assets (much of that in the \$20.8 billion Heritage Saving Trust Fund), which reduce the net debt (and the income of which contributes to general revenues). While net debt in 2023–24 is projected to be \$56 billion, the gross debt is expected to be \$96 billion. Per capita, the \$96 billion converts to \$20,246 per Albertan. Also, if net debt were to be 25 per cent of GDP in 2023–24, it would amount to about \$114 billion or about \$ 24,300 per person — that is, an amount exceeding the current levels in Quebec and Ontario.

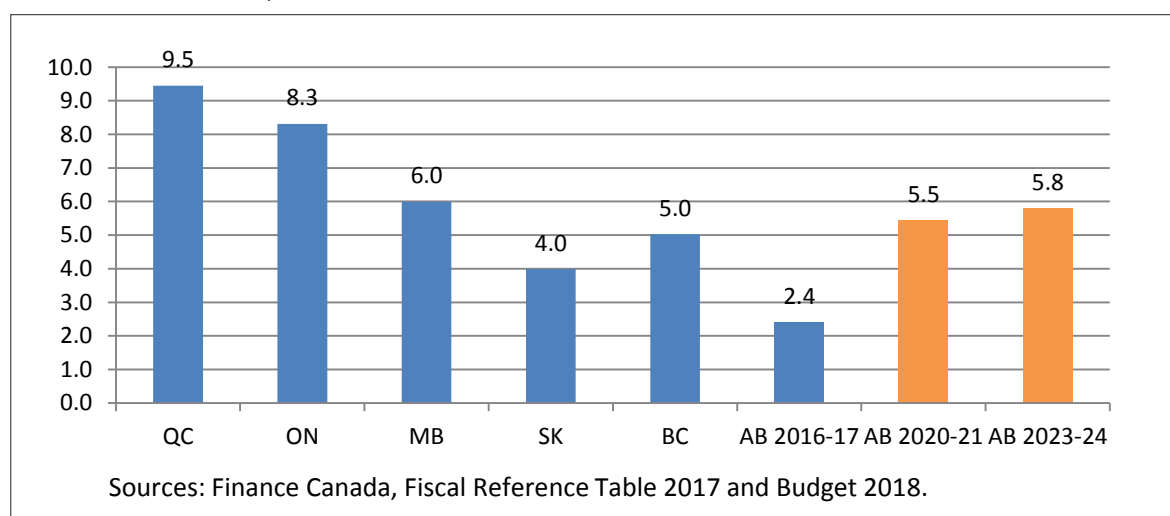
FIGURE 13 DOLLARS OF NET DEBT PER CAPITA, 2016-17 AND PROJECTIONS



³¹ Capital investment averaging \$6 billion annually will likely be sufficient to equal the annual linear depreciation (as assumed in the calculations of net capital stock above) to 2023–24. However, the \$4.8 billion projected in the final year will be well below the annual depreciation. Hence, the capital plan to 2023–24 is expected to be sufficient to meet (linear) depreciation. The scheduled amortization in the provincial budget (about \$2.6 billion annually) is, however, substantially less than linear depreciation assumed.

The accumulation of provincial debt, whether to finance capital or operating expenditures, imposes additional costs on the provincial taxpayers. Interest must be paid on the debt and, unless the debt is refinanced, it must be repaid. The ramping up of Alberta's net debt over five years from effectively zero to \$48.2 billion in 2020–21 and to \$56 billion in 2023–24 adds \$2.4 billion of interest cost to the provincial expenditures bringing that total to \$3.8 billion.³² As shown in Figure 14, interest costs are expected to increase from 2.4 per cent to 5.5 per cent of government revenues by 2020–21 (and then to 5.8 per cent by 2023–24).³³ Given projected revenues, those charges reduce the funds available for spending on program expenditures; that is, services to Albertans. This is certainly the consequence under the plan to balance in Budget 2018. With total revenues and expenditures balanced in 2023–24, the \$3.8 billion of debt interest will not be available to fund services.³⁴

FIGURE 14 PROVINCIAL GOVERNMENT DEBT INTEREST AS A PERCENTAGE OF PROVINCIAL GOVERNMENT REVENUES, 2016-17



Ultimately, debt interest becomes a burden on taxpayers. Bazel et al. (2018) estimate the present values of the taxes on typical Alberta income-tax payers over their lifetimes that are required to pay \$3.8 billion in annual interest. That ranges from \$42,252 for a 16-year-old and rises to \$49,864 for a 36-year-old, before declining gradually to almost zero for an 80-year-old. The present value exceeds \$40,000 for those 50 or younger. In addition, as Alberta's former auditor general (2018, 21) notes, "A surplus of \$3 billion per year every year for 25 years would be needed to pay off the debt expected to be accumulated by 2021." And beyond that, he also observed, "The surplus would

³² The \$3.8-billion estimates comes from Bazel et al. (2018) at: <https://www.policyschool.ca/wp-content/uploads/2018/05/Fiscal-Trends-AB-Public-Debt-Bazel-Crisan-Dahlby.pdf>.

³³ While net assets were still positive, but small at \$3.9 billion in 2016–17, the province had \$19.1 billion in debt for capital projects. After being a net lender for 11 of the previous 12 years, Alberta became a net borrower (i.e., began accumulating debt) in 2007–08.

³⁴ The debt-interest burden is a significant component of the expenditure restraint (particularly program expenditures) outlined in Budget 2018. Constraining expenditure growth to be less than inflation and population growth is the other major overarching component. If realized, a consequence will be that program expenditures in 2023–24 as a percentage of household income will be as low as it was at the depths of the years of the Klein cuts — a level about 15-per-cent lower than the level experienced over the past decade. See McMillan (2018) at: <https://www.policyschool.ca/wp-content/uploads/2018/10/Fiscal-Trends-AB-Gov-Spending-McMillan.pdf>. Also interesting is that planned capital expenditures are reduced considerably for 2022–23 and 2023–24. The reduction is sufficiently large so as to be a potential concern (Dahlby, 2018).

need to be even more, approximately another \$1 to \$2 billion per year, to be able to replace and add infrastructure without increasing debt further.”³⁵

Government debt implies lower services and higher taxes than otherwise. Given that it appears to be the case that Alberta is in a low resource-revenue environment, the province should consider adapting to its new fiscal situation. The provincial economy is emerging from recession so the case for counter-cyclical finance is past and there is logic for not protracting the fiscal adjustment and for not accumulating more debt than necessary. That is, even if the province can readily borrow and debt is not as large as in some other provinces, let the province move promptly to get its fiscal house in order and avoid undue and unnecessary burdens on Albertans.

6 CAPITAL INVESTMENT AS A STABILIZATION TOOL

Government infrastructure investment is widely regarded as a valuable instrument for helping to moderate fluctuations in the economy. Ideally, government capital spending can be ramped up when the private sector is contracting and private capital investment is waning, and can then be reduced when the private sector and especially private investment is proceeding at a more solid pace — a pattern that may also allow government to take advantage of lower input costs and of lower interest rates if borrowing. Practical problems — for example, uncertainty about the strength and duration of economic cycles, ability to implement and slow valuable infrastructure spending in a timely fashion, the need for infrastructure to support the private sector and households in a growing economy — complicate implementation but, with good planning, counter-cyclical (even stable) infrastructure investment can be a useful stabilizing tool.

The pattern of Alberta’s provincial infrastructure investment and its relationship with the economy is the topic of this section. Initially, the long-run trend is examined and compared to predicted levels. Then the level of provincial capital investment relative to the performance of the economy, as indicated by the level of unemployment, is examined.

Real per capita provincial capital investment in Alberta is presented in Figure 15 along with the predicted investments from two regression models. The one set of predicted levels (the red line) comes from a fixed effects panel analysis of the six provinces examined above. The regression model included unemployment, population change, real household income per capita and the real per capita levels of four variables indicating a provincial government’s fiscal position: investment income, transfers, debt-servicing costs and surplus/deficit.³⁶ The correlation of the predicted and actual values is 0.816.³⁷ The second set of predicted values (the green line) comes from a regression of the same variables but using the Alberta data only. These predictions correspond more closely to

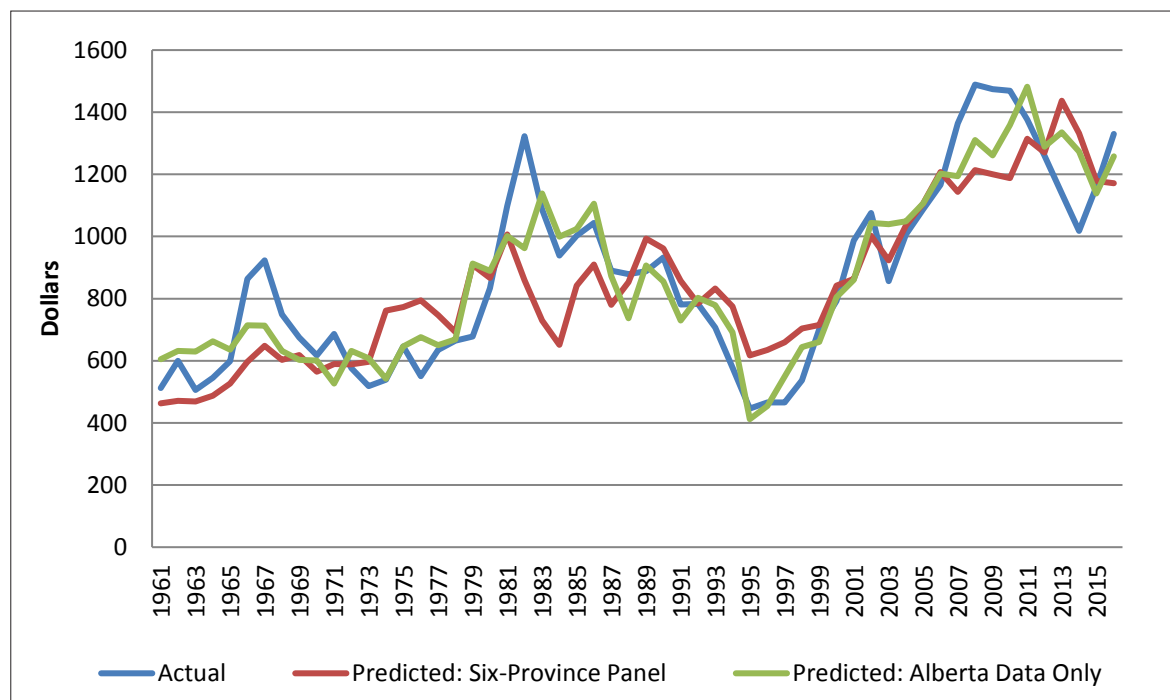
³⁵ To preserve a historic perspective (not that the past illustrates good practice or a case that might be repeated), compare Alberta’s projected debt burden with that in the mid-1990s. The debt interest of \$3.8 billion in 2023–24 amounts to \$810 per capita in 2023–24 dollars. From 1994 to 1997, Albertans (not unlike the residents of many other provinces) were paying, at relatively high interest rates, over \$800 per person in 2002 dollars in debt interest (for an average \$901 per capita over the four years). At that time, those payments averaged almost 3.0 per cent of per capita household incomes, while \$810 per capita in 2023–24 is projected to amount to 1.2 per cent of household income. Also, as a result of fiscal restraint and growing revenues (particularly resource revenue), debt-interest payments per Albertan had declined to \$200 (2002 dollars) per capita by 2003–04 and remained below that level until 2015–16.

³⁶ See Appendix B for the regressions.

³⁷ Real household income is the main determinant, while the government fiscal variables as a group are the next most important (with debt servicing being the most important of those) and with unemployment and population change making minor contributions.

the actual investment levels (with a correlation of 0.918). The pattern of investment in Alberta is not as well predicted when including the behaviour in the other provinces.

FIGURE 15 ALBERTA PROVINCIAL GOVERNMENT INVESTMENT PER CAPITA: ACTUAL AND PREDICTIONS, 2007 DOLLARS, 1961-2016



Even when using the predictions from the Alberta data, the actual data tend to have peaks (especially) and troughs that deviate significantly from the predicted levels. Note especially the years 1966–68, 1982, 2007–08 and 2014. In addition, the predictions from the six-province panel diverge considerably from the actual and predicted Alberta data in some years; notably 1974–75, 1982–86, 1995–97, and, possibly one might argue, in 2009 and 2014. The confounding factor is the large peak-to-trough swings in Alberta’s provincial government investments. Most notable is that from 1981–1986, when investment averaged \$1,082 per person, to the 1994–98 trough when investment averaged \$498 per capita only to rebound to over \$1,400 less than a decade later.³⁸ While one might expect that the maintenance of the capital stock, replacement of expired capital and the additions of new stock would imply relatively steady investments, clearly the decisions are more complicated. Comparing the regressions on the Alberta data and the panel data offers some insight. In both, real household income is the main determinant of the upward trend in provincial government investment. It is essentially the government variables, however, that explain the fluctuations around the trend. Also, the government variables add considerably more to the explanatory power of the Alberta-only analysis than to the panel analysis. Variations in the levels of investment income in Alberta are important, but it is a much stronger negative response to debt-interest cost demonstrated in the Alberta-only data compared to the panel data that better explains provincial government investment.³⁹ That is, the greater adverse impact of debt-interest payments

³⁸ While the other five provinces have experienced a surge of provincial investment since the late 1990s, the swings have been less pronounced.

³⁹ All provinces experienced large increases in debt-interest costs during the 1980s and 1990s, but the deterioration in public investment in Alberta was much greater than elsewhere.

on provincial government investment in Alberta than in the other provinces helps explain better the considerable swings in the Alberta investment levels.

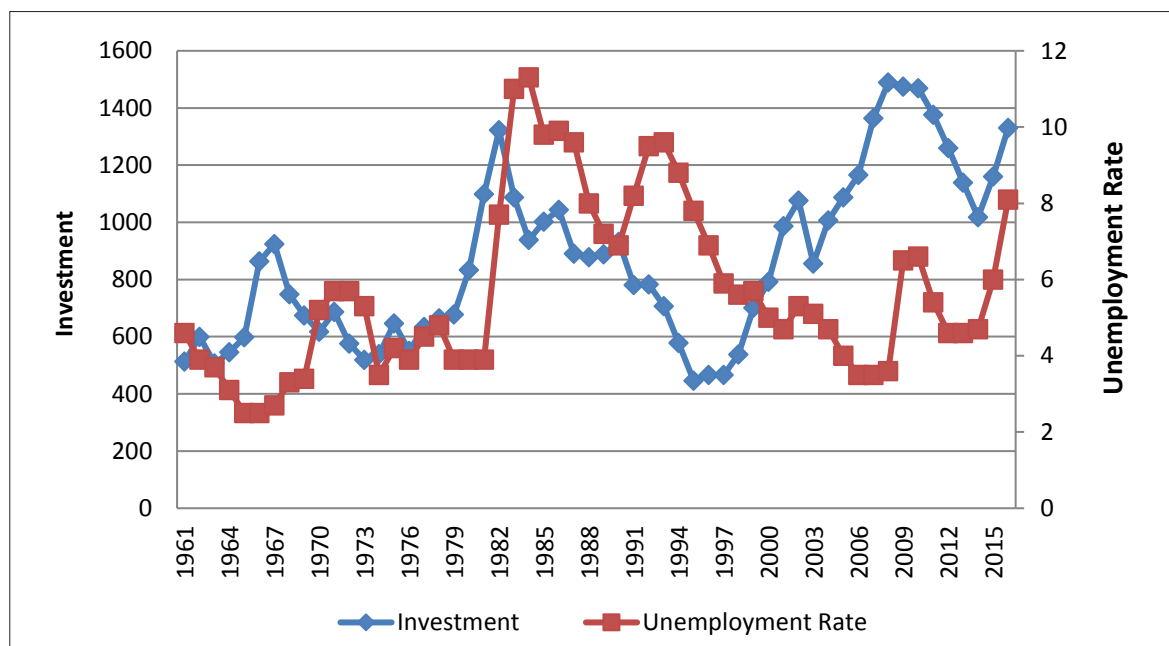
If public investment was used to help stabilize the economy, one would expect it to be high when unemployment was high and low when unemployment was low. The regression analyses found that unemployment was quite unimportant in explaining provincial government investment, suggesting that public investment has not been an important tool for economic stabilization. Alberta illustrates the situation. Public investment (real per capita) and the unemployment rate are plotted in Figure 16 for Alberta. Following chronologically, investment was high when the unemployment rate was low from 1966 to 1969, but it continued to decline while unemployment was relatively high from 1970 to 1973. Unemployment surged in 1982 and remained high (relative to an overall average rate of 5.7 per cent) until 1997. Provincial government investment grew quickly to a peak in 1982 but then declined, although it remained relatively high until 1991. Despite a sharp uptick in and continued high unemployment through most of the 1990s, public investment trended down and was especially low from 1995 to 1998. The 2000s saw economic recovery with low levels of unemployment and rising levels of provincial government investment. That investment was sustained through the 2009–10 downturn, and then slackened, but increased in 2015 and 2016 as the government sought to cope with the recession triggered by the oil-price collapse. Clearly, the performance of Alberta's provincial government investment as a counter-cyclical tool is mixed. Rather, provincial public investment has tended to increase when there were surpluses and decline when there were deficits.^{40,41} The low levels of investment during the 1990s particularly reflect efforts to reduce deficits but also efforts to cope with the high debt-servicing costs. Economic stabilization has recently appeared as an important consideration in public investment decision-making. The continuation of investment included in provincial budgets for 2009 and 2010 following the financial crisis and the accompanying energy-price drop illustrates the case. The NDP government's Budget 2015, expanding provincial capital spending explicitly as a means to help offset the weak economy that was emerging at the time, is the latest example.⁴²

⁴⁰ Although not strong, the correlation between real per capita provincial investment and the unemployment rate is positive at 0.115. In contrast, the correlation in the other five provinces is negative, at -0.124, suggesting more counter-cyclic responses.

⁴¹ The pro-cyclic pattern of provincial expenditures in Alberta has been widely noted. For example, see many of the papers in Boothe and Reid (2001), Bruce et al. (1997), Ryan (2013) and Wilson (2002).

⁴² These observations are supported by the somewhat superior performance of unemployment as an explanatory variable of provincial government investment in regressions on Alberta data since 2000. Even during this short period, government fiscal variables explain much of the variation and, interestingly, debt-interest costs continue to be a major contributor.

FIGURE 16 ALBERTA PROVINCIAL GOVERNMENT INVESTMENT PER CAPITA IN 2007 DOLLARS AND PROVINCIAL UNEMPLOYMENT RATE, 1961-2016

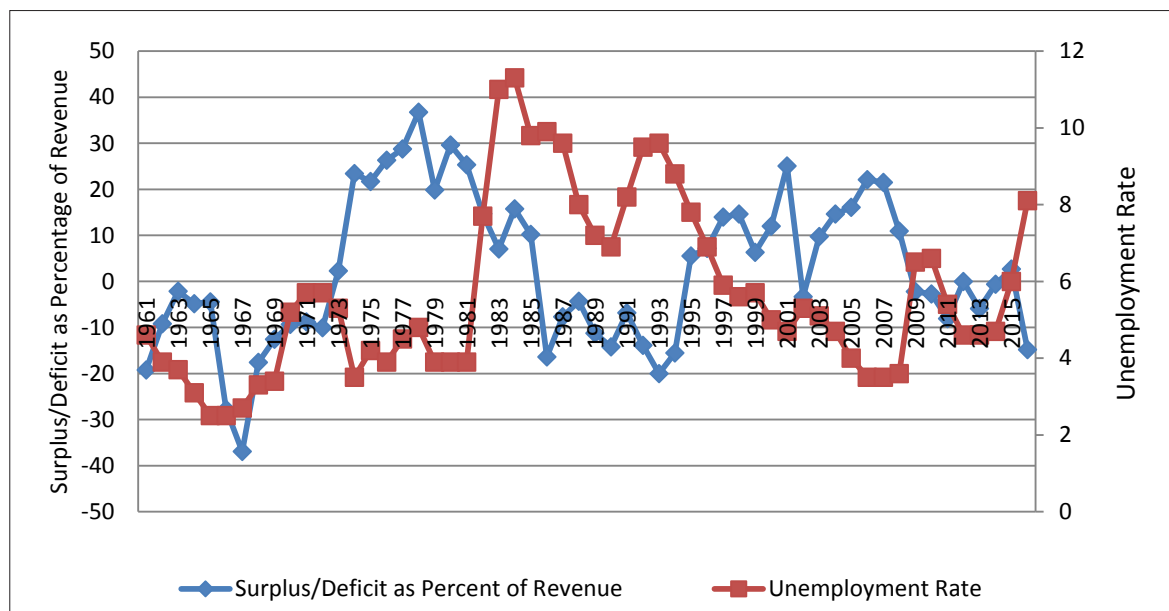


Public investment is only one possible avenue towards stabilization efforts. More important is the overall government surplus/deficit. Here Alberta is on stronger footing. Figure 17 shows the pattern. Over the years, the province has tended to run surpluses, or save, when the economy was strong and unemployment low (and, typically, resource revenues large) and run deficits, or dis-save, when the economy was weak and unemployment high (and resource revenues typically low). Thus, although Alberta's program spending is well-known to be pro-cyclical,⁴³ the province has often managed to dampen the economic cycle associated with resource-revenue volatility.⁴⁴ That is, the pro-cyclic pattern of program spending is moderated (compared to a no saving/dis-saving policy) by saving when the economy was strong and dis-saving when the economy was weak. Thus, while the province's expenditures have been responsive to resource revenues, the saving/dis-saving behaviour has provided some stabilization.

⁴³ Ferde (2018) and Kneebone and Wilkins provide recent examinations of Alberta's fiscal responses to fluctuations in and reliance upon resource revenues.

⁴⁴ The correlation between the unemployment rate and the surplus/deficit as a percentage of revenue since 1973 is fairly large and negative at -0.59.

FIGURE 17 ALBERTA SURPLUS/DEFICIT AS A PERCENTAGE OF REVENUE AND UNEMPLOYMENT RATE, 1961-2016



The Alberta government's public investment has played a minor, and indeed mixed, role in economic stabilization since 1961 (often pro-cyclical as opposed to being counter-cyclical). Alberta has experienced exceptionally large swings in government investment. Those fluctuations are largely explained by the provincial government's fiscal situation and notably by the magnitude of debt-service costs. More recently, and especially during the past decade, public investment has been used to counter economic downturns. The government's overall surplus or deficit is the major tool in pursuing stabilization and with that, although many would consider its practices less than ideal, the Alberta government has demonstrated some overall success.⁴⁵

7. OPPORTUNITIES FOR IMPROVEMENT

Over the period of this analysis (i.e., since 1961), Alberta's per capita capital stock has varied widely and provincial capital investment has fluctuated dramatically — more so than is consistent with sound infrastructure management. Are there practices and policies that could be followed that might moderate the swings and stabilize public capital at appropriate levels and ensure the investment required to maintain those stocks and to provide for growth? Some suggestions are outlined here.

Initially, however, recognizing the perspective brought to the question is important. First, the focus here is on capital and capital investment, largely setting aside the broader expenditure/revenue balance. Second, and most important, is to acknowledge that the public capital stock continuously deteriorates and needs regular maintenance and replacement as well as needing gradual expansion and improvement as population, the economy and incomes grow. This situation calls for steady investment, not gyrations between starving and gorging, or stop-and-go financing as Alberta has so often witnessed. Cutting back capital investment when government revenues wane may seem

⁴⁵ The economic downturns of the past decade have witnessed rather different responses than during the 1990s. Faced with the setbacks of 2009 and 2015, the provincial governments were concerned about economic stabilization. While implementing efforts to exert greater control on expenditures, dramatic cuts (notably to capital investment) were largely avoided. As a result, real per capita expenditures have been quite stable and provincial infrastructure has roughly been maintained.

appealing as deterioration and shortages do not immediately appear, but deferrals typically prove expensive as repairs escalate and catching up likely occurs when prices are high. Better that public investment be considered and treated as important as stability in operations.

To begin, the efforts of the Alberta government in the early 2000s must be acknowledged. Following the recommendations of the Financial Management Commission, the province introduced a special Capital Account in 2002–03 and Sustainability Fund in 2003–04 under its New Fiscal Framework. The Capital Account was to provide another source of financing for the province’s capital outlays and, in particular, to set aside extra revenues to pre-fund future capital projects. The Sustainability Fund was to house part of surplus revenues so as to have funds available to fund potential budget shortfalls.⁴⁶ These funds were to add to available resources, to take the uncertainty out of capital funding and, overall, to replace volatility with predictability. By 2008–09, the Capital Account had grown to \$6.97 billion and the Sustainability Fund to \$9.85 billion (for a total of almost \$17 billion). The fiscal difficulties that followed the global financial crises resulted in the Capital Account being merged with the Sustainability Fund in 2010 and the Sustainability Fund falling to \$3.3 billion in 2012–13.⁴⁷ The Capital Account had potential but did not survive. Still, with political will and commitment, the concept could be helpful.

The fiscal difficulties that emerged in Alberta after the global financial crises saw the emergence of a practice that should be avoided in the future. After 2008–09, natural gas prices collapsed to persistently low levels and that had a serious adverse impact on provincial revenues. As part of its strategy to cope, the Stelmach and Redford governments began borrowing, rationalizing the new debt by claiming it was appropriate because it was to fund capital projects. Justifications for that included references to it being comparable to a household taking on a mortgage to purchase a house, or that it was a way to ensure greater intergenerational equity (that future generations should share the cost of infrastructure they, too, would benefit from). Such arguments are largely illusionary and misleading.⁴⁸ The first ignores that households have a finite life while society and its governments are perpetual. And both, if taken to their logical conclusion, would justify financing all government capital with debt. Such a policy would result in a large and permanent provincial debt and impose higher costs on taxpayers due to the interest paid. Provinces do not permit their municipalities to do this and they should not do it themselves. Alberta should treat capital investment for what it actually is: the necessary, regular and ongoing outlay/expenditure of society to maintain the appropriate level of infrastructure for its residents. Were that accomplished, debt could be reserved for coping with unexpected and short-term cyclic downturns (should adequate stabilization reserves not be available).

Stabilizing public investment requires a rethinking of the approach to public capital budgeting. It requires stepping away from approaching capital outlays as always being the category to cut first in austerity and augment when revenues are flush. Rather than stop-and-go financing, governments should budget for the cost of maintaining the real per capita capital stock — that is, funds adequate to maintain the existing stock and to add what is necessary to meet population growth. The needed amounts should be part of the annual budget just as much as operating expenditures.

⁴⁶ See Budget 2003.

⁴⁷ The successor current cash reserve of the government is now approximately the same in real per capita terms.

⁴⁸ See Dahlby and Smart (2016) and McMillan (2015a, 21–23) for discussion as to why governments should not rely on borrowing to fund capital investment. Dahlby and Smart conclude that, under scrutiny, the usual arguments for the debt finance of infrastructure “hold almost no water at all.” Also note, the argument/policy favouring borrowing for capital purposes only appeared in Alberta’s public finance in Budget 2009 and has persisted largely as a mechanism for avoiding or deferring difficult fiscal choices, although, more recently, the argument has shifted (beyond stabilization) to expanded capital outlays being required and borrowing being affordable.

That means that the budgeted revenue base may need adjustment (in level or rearrangement) to accommodate an adequate and stable capital program. Especially in a resource-based economy such as Alberta's, provincial government revenues are volatile. A stabilization fund (to meet both capital and operational needs when required) is a means of managing volatility. Contributions to and withdrawals from such a fund, however, must be adjusted to the realities underlying resource revenues to avoid depletion.⁴⁹ Borrowing should not be necessary for financing capital per se. Debt can be reserved for meeting financing requirements (operating and capital) when revenues are unexpectedly insufficient and stabilization funds are inadequate.

How might such a (capital) budgeting program be realized? Bazel and Mintz (2015) suggest arm's-length institutions to evaluate and prioritize government capital projects.⁵⁰ While ensuring an economic and a long-term perspective, one must wonder whether provincial politicians (and departments/agencies and even voters) would be willing to relinquish so much control to an independent authority. As Bazel and Mintz also point out, expanding user charges for capital intensive public services — for example, tolling by an autonomous and self-financing highway authority — would be a step in the desired direction.⁵¹ There are, however, limitations to the capital to which charges might apply (e.g., less so for schools and hospitals). Furthermore, the separation of capital and current/operating budgets is problematic. In the context of Swiss cantons (provinces), Dafflon (2018) reviews and advocates for rules governing deficits and debt and he revisits and extends the golden rule of public finance to link capital and operating budgets. While the golden rule states that operating budgets should always be balanced or be in surplus and that governments should only borrow to fund capital projects, Dafflon refines it to add that interest and amortization of debt should be repaid from operations and that the operating and maintenance costs associated with capital projects should be incorporated into long-term budgeting. While self-imposed debt/deficit management rules seem to have worked well for Swiss cantons, they have been less effective for Canadian provinces. Although budget-balance and debt-management rules appeared to have had some effect from 1981 to 2007, the provinces relaxed them following the financial crises of 2008 and the ensuing fiscal difficulties (Tapp, 2013). Alberta is a prime example of this, as the rules have often been relaxed as fiscal conditions tightened.

A longer-term perspective on capital budgets would be beneficial. That is, what is called for is a perspective longer than that to which most political decision-makers are inclined. Possibly effective in promoting this is an intermediate strategy building on existing practices and institutions. The suggestion is that a government body would a) evaluate the status of public capital, b) assess all

⁴⁹ This point warrants a comment on recent policies. During the past decade, the province experienced two major negative impacts on its resource revenue — that is, as a result of a drop in natural gas prices to a persisting low level and then a drop in oil prices — and two recessions. Even now with some recovery in oil prices and projections of further improvements, real per capita resource revenues are expected to recover less than 40 per cent of the reduction experienced from the resource revenues realized from 2000 to 2014, and reaching even that level is expected only in 2023–24 (as projected in Budget 2018). That is, the Alberta government is expecting resource revenues to contribute 60-per-cent less to provincial revenues in the longer term than in the past and less than that in the near term. Alberta has gone through those two resource-revenue setbacks denying that they are structural changes and treating them instead as cyclical. As a result, a very healthy stabilization fund has been drained and debt has been accumulated. Now that the province is in recovery, it is time for Albertans and their government to face the reality that resource revenues will not (or at least are very unlikely to) fund as large a share of the programs and capital services as those to which they have become accustomed. While it is difficult today to look at what appears to be possible only in the rather distant future, it is recommended that the province eventually recognize the need for some revenue replacement and reduced borrowing as well as, in particular, abandoning borrowing for capital purposes.

⁵⁰ They also recommend similar but separate provincial lending institutions to assess municipal capital projects and to manage and control the lending for them.

⁵¹ Some municipalities have achieved success along these lines by shifting utility operations from government departments to self-financing independent corporations.

capital projects under consideration, c) identify any gaps and draw implications, and d) disseminate the results.⁵² It may not be necessary that the responsibility rest with an independent authority but rather be a branch within Treasury or Finance. What is important is that it have a government-wide perspective and work with the other government departments and agencies. An important part of its reporting would be to assess the state of public capital devoted to the various government programs and determine in a general way the expenditure required to maintain that stock, allowing for population growth.⁵³ Undertaking, or at least evaluating and summarizing, economic assessments of proposed capital projects (be they maintenance, renewal or entirely new) is a second major responsibility. Once having completed those first two tasks, the authority can then assess whether there are gaps in the capital program or areas of potential overinvestment, and outline the likely consequences of alternative investment strategies on the government capital stock, the services that stock renders and the implications for near-term and longer-term budgets.⁵⁴ Finally, the results of its analyses should be published and open to all interested parties; budget planners and bureaucrats across the government but, in particular, the members of the legislature, municipalities, bodies and groups impacted by and interested in infrastructure decisions, and the individual citizens. A major objective here is to expand transparency to facilitate better decision-making. Unlike Bazel and Mintz's concept, this body would have no decision-making or prioritizing power. Rather, it is intended to provide information and outline economic consequences. Decisions would be made through the regular political processes but would be based on more complete and more widely dispersed information. With more transparent assessment of capital planning and the implications at the micro and macro levels, greater stability in investments and stocks can be expected. In addition, these reports would provide the auditor general a benchmark with which to assess the province's capital budgeting. As such, a body with capital-oversight responsibility might contribute to generating a long-term perspective in government as recommended in recent commentary from the auditor general.

8. SUMMARY AND CONCLUSIONS

To support its economy and to serve its citizens, Alberta's provincial government maintains a large stock of public infrastructure (e.g., schools, hospitals and highways). Recently, the province's net capital stock has amounted to over \$10,200 (in 2007 dollars) per person.⁵⁵ Surprisingly, provincial investment has fluctuated dramatically and even the levels of capital stock have demonstrated large swings. In addition, in his 2015 recommendations to the province, David Dodge advised the province to expand considerably its capital investment and increase its level of infrastructure and to do so largely by borrowing. The large movements in investment and stocks are concerning and the Dodge recommendations pose an important policy question. Both are factors motivating this analysis. Their consideration is important as the province gradually emerges from recession to face what may be a slow recovery to a possibly rather different and more difficult economic environment.

⁵² It is acknowledged that such evaluations are done now, in part; for example, see Annual Report of the Department of Infrastructure.

⁵³ Efficiency analyses such as that by Chen (2018) could provide useful input.

⁵⁴ To a considerable degree, these tasks would be gathering together, building upon and providing detail on already existing activities of government departments and agencies.

⁵⁵ Municipal government capital, also an important contributor to residents' well-being, has amounted to one-third the combined provincial and municipal total and recently has expanded to one-half. Provincial grants, however, have funded about one-third of municipal capital investment.

Dodge recommended that the province increase its capital stock to 16 per cent of GDP. That recommendation was based on comparison of ratios of provincial government net capital stock to GDP in Alberta to those in British Columbia, Saskatchewan, Manitoba, Ontario and Quebec — a comparison that found Alberta consistently below the five-province average (and also in investment to GDP) since the early 1990s. However, when examined on a per capita basis, as I have done here, the Alberta provincial government is found to have net capital stock 24-per-cent greater than the five-province average (a differential that expands to 50 per cent if municipal government net capital stock is included). In per capita terms, Alberta appears to have no deficiency in provincial government or sub-national infrastructure.

The divergence of the two indicators leads to asking whether Alberta is different. Comparison of the six economies indicates that Alberta is different. Over the 1990 to 2016 period, GDP per person in Alberta averaged 63-per-cent greater than the average of the other five provinces. In addition, the private, non-residential capital per person vastly exceeds the levels in the other provinces. As a result, corporate net operating surpluses are typically a much larger percentage of GDP and employee compensation and household incomes are typically lower percentages. Nevertheless, household incomes per capita are much larger. An exploratory econometric analysis confirmed that Alberta is distinct. It also confirmed that the economies of British Columbia, Manitoba, Ontario and Quebec are the most comparable to one another, while that of Saskatchewan (a largely resource-based economy like Alberta) is different and somewhat more akin to that of Alberta. Also, that analysis suggested that household income, not GDP, was the main positive determinant of provincial public capital stocks. Overall, the analyses indicate that the 16-per-cent-of-GDP recommendation is not a reliable guide to the appropriate level of provincial government net capital stock in Alberta. Public infrastructure investment decision-making is more complex and requires more discerning analysis.

The sharp drop in oil prices in 2014 and 2015 generated a recession in Alberta that substantially changed the economic picture of the province and dramatically changed the fiscal position of the provincial government. Due primarily to the drop in resource revenues, the province faced larger deficits. Partially following Dodge's advice, the province increased capital investment (by about 15 per cent) and maintained operating expenditures by increased borrowing. Dodge argued that even a net-debt-to-GDP ratio of 25 per cent (potentially emerging so as to increase the province's net capital stock to 16 per cent of GDP) was "moderate" compared to the levels in the five other provinces. Again, however, comparison to GDP is misleading in Alberta's case. Relative to GDP, the size of the provincial government is small compared to other provinces (although revenues per person are comparable): 13.5 per cent in 2016–17 versus a range of 17.7 to 25.9 per cent as found in Ontario and Quebec respectively. Since government is relatively smaller in Alberta, caution is necessary when comparing government debt to GDP. A 25-per-cent level of debt to GDP in Alberta would amount to debt that was 186 per cent of government revenue, a level surpassed only by the 214-per-cent level of Ontario and definitely not modest. Because it better reflects the burden on provincial taxpayers, measuring debt to government revenue is preferred to debt to GDP. The provincial government plans to balance its budget in 2023–24 with net debt amounting to \$11,915 per person or 12.3 per cent of GDP and 85 per cent of government revenue. Despite this comparatively moderate level, interest on the debt will amount to \$3.8 billion annually. That and the funds necessary to pay off the debt (perhaps \$3 billion each year) will encroach on the resources available to provide services to the province's residents. Keeping debt low will reduce the revenues required for servicing and repaying debt and free up funds for providing additional services or enabling lower taxes.

Public capital investment can be an effective economic stabilization tool. Provincial government investment has fluctuated substantially in Alberta, most notably from about \$600 per capita (in 2007 dollars) in the early 1970s, to almost \$1,100 in the early 1980s, to \$500 in the mid-1990s, to about \$1,400 from 2007 to 2011. While household income explains the upward trend, provincial government fiscal variables (and particularly the burden of debt servicing) accounts for much of the variation around the trend. Have these movements been stabilizing? Comparing provincial government capital investment and unemployment patterns indicates that provincial investment's stabilization role has been mixed. There is even some evidence that it has been more pro-cyclic than counter-cyclic in its application. On the other hand, the provincial government's overall surplus/deficits pattern has tended to be counter-cyclic. That is, the province has tended to run surpluses when the economy was strong and unemployment low and deficits when the economy was weak and unemployment high and, so, has often managed to dampen the economic cycle associated with resource-revenue volatility. In contrast to the 1990s, economic stabilization was a priority during the economic downturns of 2009 and 2015. That shift is reflected in provincial investments and, initially, dissaving and, then, borrowing. However, a failure and then a reluctance to adjust to the structural changes in resource-revenue setbacks (and, instead, treating them as cyclic) has resulted in an excessive reliance on dissaving and borrowing.

The demands for provincial infrastructure investment grow with population, the economy and incomes. In addition, the public capital stock continuously deteriorates and needs regular maintenance. These features call for steady investment, even during recessions. Stabilizing public investment requires rethinking the approach to public capital budgeting. That is challenging, particularly in a volatile resource-based economy. Nonetheless, suggestions are offered. Alberta tried a Capital Account in combination with a Sustainability Fund (a stabilization fund) but lacked the political will to hold to that course. Faced with a serious deterioration in resource revenues (particularly for natural gas), provincial governments began rationalizing borrowing, provided it was (ostensibly) used to fund capital. That rationalization is misleading, offers no permanent solution and risks being a costly distortion.

New options exist and are mentioned. One is for an independent capital authority to evaluate, prioritize and finance provincial government infrastructure. That, however, may be seen as unduly encroaching on the authority of provincial decision-makers. Designing rules to regulate deficits and debt while integrating operating and capital budgets has also been advanced as an alternative. Self-imposed deficit/debt rules, however, have not proven very effective with provincial governments. A final suggestion may conform better to existing institutions. That is a, possibly independent, public authority to expand the information on infrastructure and increase public transparency on capital undertakings and their options. It would gather information on the conditions, evaluate options, identify gaps and excesses, and disseminate that information to political decision-makers and the public, but leave the decision-making to the normal political processes. Basically, it would be to better inform and to better integrate capital decision-making into public budgeting. As such, it should contribute to generating in government a longer-term perspective as recommended in the recent commentary by Alberta's auditor general.

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APPENDIX A. ILLUSTRATIVE REGRESSIONS FOR EXPLAINING LEVELS OF PROVINCIAL CAPITAL

Regression Results for Provincial Capital as a Percentage of GDP and Provincial Capital Per Capita		
Dependent Variable: Provincial Capital as a Percentage of GDP		
Variable	AB & SK	Other Four Provinces (BC, MB, ON, QC)
Real GDP per capita	(0.0006509)***	(0.0006392)***
Real HHI per capita	0.0004974***	0.0006046***
Population	0.0000012***	7.3E-07***
Population change	(0.7389273)***	0.5929964**
Constant	35.49831***	18.60948***
# of observations	72	144
Correlation of predicted with actual	0.97	0.82

Dependent Variable: Provincial Capital Per Capita		
Variable	AB & SK	Other Four Provinces (BC, MB, ON, QC)
Real GDP per capita	(0.1286171)***	(0.0600807)**
Real HHI per capita	0.3017012***	0.2593061***
Population	(0.0008414)***	0.0001213
Population change	(583.1987)***	228.5885**
Constant	8907.703***	107.1537
# of observations	72	144
Correlation of predicted with actual	0.88	0.85

Note: Regressions are run on data covering 1981 to 2016 using panel regressions with fixed effects for provinces. Brackets indicate negative numbers. *, ** and *** indicate statistical significance of the coefficient at the 10-, five- and one-per-cent levels.

APPENDIX B. REGRESSIONS TO PREDICT ALBERTA PROVINCIAL GOVERNMENT INVESTMENT PER CAPITA

Results of Alternative Regressions to Alberta Government Investment Per Capita		
	Alberta	Six Provinces (BC, AB, SK, MB, ON, QC)
Unemployment rate	19.78526	(42.15697)**
Population change, percentage	(28.58009)	12.28469
Household income, real per capita	0.0226099***	0.0202545***
Prov. Investment income, real per capita	0.113181***	0.0708958
Transfers to province, real per capita	(0.2390039)***	0.1945796***
Prov. debt servicing cost, real per capita	(0.7622642)***	(0.2127891)**
Prov. Surplus/deficit, real per capita	(0.1167292)***	(0.1009037)***
Constant	402.1454***	251.454**
# of observations	56	336
Correlation of predicted with actual	0.918	0.816

Note: Regressions are run on data covering 1961 to 2016 using panel regressions with fixed effects for provinces when data from the six provinces are used but ordinary least squares when only Alberta data are used. Brackets indicate negative numbers. *, ** and *** indicate statistical significance of the coefficient at the 10-, five- and one-per-cent levels.

About the Author

Melville McMillan is professor emeritus in the department of economics and a fellow of the Institute of Public Economics at the University of Alberta. His BA and MSc are from the University of Alberta and his PhD is from Cornell University. After a brief stint at the University of Wisconsin (Madison), he joined the University of Alberta in 1975. McMillan's research and teaching interests are in public economics and, in particular, public finance, fiscal federalism, urban and local economics, and the demand for and supply of public goods and services. He has published in these areas and has also advised governments and organizations nationally and internationally (e.g., the World Bank). Although "retired," McMillan remains engaged in academic and policy matters.

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ISSN

ISSN 2560-8312 The School of Public Policy Publications (Print)
ISSN 2560-8320 The School of Public Policy Publications (Online)

DATE OF ISSUE

March 2019

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